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Florida's Inshore Marine Monitoring and Assessment Program (IMAP)

Annual Report, Year Two

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DISCLAIMER

This report represents data and activities from the second year of the Florida Inshore Marine Monitoring and Assessment Program (IMAP). IMAP is a collaborative project between the U.S. Environmental Protection Agency and the Florida Fish and Wildlife Conservation Commission's Florida Marine Research Institute (FMRI) designed to assess the ecological condition of Florida's inshore waters using a set of ecological indicators. IMAP began full-scale field sampling in summer of 2000. This report was submitted in fulfillment of EPA Assistance ID NO. CR 827240-01-0 by the Florida Fish and Wildlife Conservation Commission under the partial sponsorship of the United States Environmental Protection Agency. This report covers a period from 1/10/2000 to 1/10/2001.

Florida's Inshore Marine Monitoring and Assessment Program (IMAP)

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1 INTRODUCTION

Florida's inshore marine systems are a diverse and unique resource. Forming the transition zone between upland drainage basins and the deep sea, these areas are noted for their high biological productivity. The majority of commercially-valuable fish and shellfish species on both coasts are dependent on estuaries during some portion of their life. Florida's estuaries are also heavily impacted by point and non-point pollutant loads from an ever-increasing coastal population. From several perspectives; economic, social, demographic, and particularly ecological, Florida's inshore marine resources are one of the state's most valuable assets.

Florida's inshore resources range from major embayments and lagoons, to smaller estuaries at river mouths, to tidal marshes and mangrove forests which merge directly with the sea (Figure 1-1).

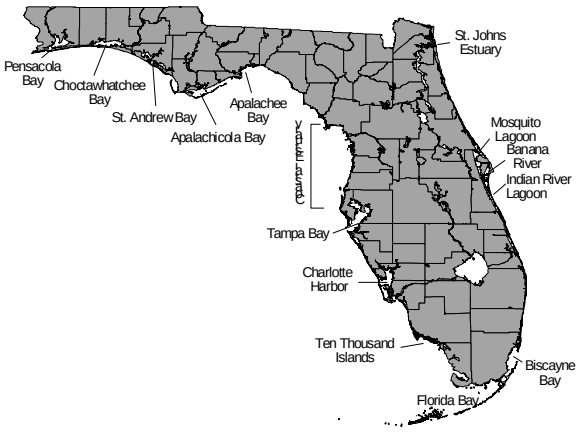

Figure 1-1. Major Estuaries in Florida

The Gulf coast consists of several well-defined estuaries in the northwest and southwest sections of the state, with a large intermediary coastal estuarine area in the big-bend region. Estuaries on the Gulf coast are often located behind low-energy barrier islands or at the mouths of rivers and typically receive high freshwater inflow. In contrast, relatively few rivers drain directly to Florida's Atlantic coast with the exception of the St. Marys and St. Johns Rivers in the northeast (Figure 1).

The Atlantic coast is characterized by high-energy shoreline bordered by long stretches of continuous barrier islands, which form high-salinity lagoons. The Mosquito Lagoon/Banana River/Indian River Lagoon complex is a long, narrow system with only a few isolated connections to the ocean along its length. The intracoastal waterway, sheltered by continuous barrier islands, forms the connection between the Indian River Lagoon and Biscayne Bay near Miami. Florida Bay and the 10,000 Islands area is dominated by numerous mangrove islands. Freshwater inflow to this area is via sheet flow from the Everglades and from many relatively small tributaries.

Florida's inshore marine systems have been the subject of countless academic, private and government-led research studies. Volumes of data have been collected in the larger systems, particularly Tampa Bay, Florida Bay and the Indian River Lagoon. IMAP is the first program capable of reporting on the status of Florida's nearshore marine systems on a statewide basis. This report summarizes results from the first of five years of sampling in IMAP. When fully implemented, IMAP will play a large role in filling the information gap on the health of Florida's estuaries.

An improved estuarine monitoring and assessment capability will enhance the quality and quantity of information provided to EPA for water quality reporting (i.e. 305(b) and related programs). Current 305(b) reporting for estuarine resources in Florida is accomplished through a compilation of disparate data collected at different spatial and temporal scales. The ability of IMAP to provide annual area-based estimates of estuarine water quality with known levels of confidence will result in more accurate and timely information transfer to EPA as mandated by the Clean Water Act.

Two initiatives currently being developed at the state level augment and enhance the results from marine inshore monitoring. First, the marine inshore component is part of a larger initiative in Florida termed the Integrated Water Resource Monitoring Network (IWRMN). IWRMN forms an

umbrella under which marine, freshwater and groundwater monitoring are all conducted within a probabalistic sampling framework. This commonality of design greatly facilitates the synthesis and comparison of environmental data, with a view toward linking upland freshwater rivers, lakes and groundwater resources to marine inshore waters. Secondly, the Department of Environmental Protection's (DEP) Division of Water Facilities, in cooperation with the Florida Fish and Wildlife Conservation Commission's Florida Marine Research Institute (FMRI) and EPA, is developing methodologies for biological assessment in estuaries. A series of workshops is planned which will bring together technical experts in corals, submerged aquatic vegetation, macrobenthos, phyto- and zooplankton, and fish to develop sampling techniques and analytical capabilities for implementing estuarine bioassessment. There is great potential for collaborative work as the marine inshore monitoring and the estuarine bioassessment activities progress in the next few years.

1.1 Program Framework

IMAP is coordinated by staff of the Florida Fish and Wildlife Conservation Commission's Florida Marine Research Institute (FMRI), headquartered in St. Petersburg, FL. FMRI operates field labs in Melbourne, Marathon, Charlotte Harbor, Tampa Bay, Cedar Key, Tequesta and East Point (Apalachicola). These field labs will be used as bases of operation for implementing IMAP statewide.

FMRI has the expertise, experience, and facilities to conduct thorough assessments of the status of inshore resources. This includes extensive field collection, specimen identification, and ecological systems analysis training and experience. Long-term monitoring programs have been established for inshore fishes in which standardized sampling protocols are used within a probabalistic sampling design. Programs in-place at FMRI currently operate boats designed to sample shallow estuarine areas, and a large percentage of the gear necessary for conducting physical, chemical and biological sampling is already available. In addition, research efforts currently underway at FMRI provide valuable guidance in the use of submerged aquatic vegetation, benthos, harmful algal blooms, aquatic health, and estuarine fishes in an ecological indicator context. FMRI also is fortunate to have on staff nationally-recognized experts in taxonomy of both invertebrates and fish of the southeastern United States and the Gulf of Mexico, especially the unique species inhabiting Florida's waters. A major reference collection of fish and invertebrates is curated at FMRI.

FMRI also has one of the best remote sensing and GIS groups in the country. Their skills are applied to a wide variety of problems concerning Florida's marine and estuarine systems. All data collected under FMRI monitoring programs are spatially referenced to ensure their suitability for future analyses.

1.2 Resource Definition and Classification

Although it is planned that IMAP will eventually incorporate monitoring related to all coastal resources within state waters, the initial strategy focuses on estuaries. IMAP bases its estuarine sampling population on estuaries delineated as part of the EPA's EMAP-Estuaries work in the Louisianian, West Indian, and Carolinian Provinces. This geographic coverage includes 477 named estuaries obtained from USGS 1:100,000-scale Digital maps (Digital Line Graphs or DLGs). EMAP used the DLGs in conjunction with NOAA navigational charts to define and delineate estuaries. A total of 477 estuaries were identified in Florida, ranging in size from 0.04 km^2 to 3,097 km^2 (Florida Bay). An example of the estuaries delineated by EMAP for the Tampa Bay area is presented in Figure 2-1.

In order to distribute sampling throughout the state, the five DEP Water Management Districts (WMDs) are used to regionalize inshore monitoring efforts. This regionalization forms part of an overall spatial framework (see next section). The use of WMDs as regions is consistent with other monitoring strategies within IWRMN. In addition, the use of WMD as regions will reduce large-scale sampling variability (i.e. Atlantic vs. Gulf coasts).

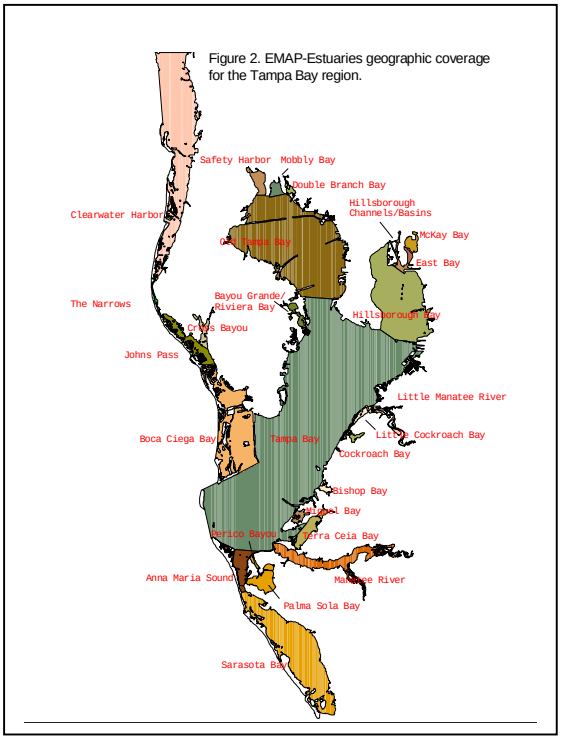

Figure 1-2. EMAP-Estuaries Geographic Coverage for the Tampa Bay Region

Head-of-tide will be used to define the upstream extent of estuarine resources. Since the freshwater component of IWRMN is using head-of-tide as their downstream boundary, this will ensure that no areas are not included in the integrated design. The seaward boundaries of estuaries were defined by EMAP to coincide with natural physical boundaries (e.g. , barrier islands). These seaward boundaries will be evaluated and modified, if necessary, to ensure safe vessel operation at all stations.

1.3 Spatial Framework

One of the issues that must be dealt with in conceptualizing an inshore monitoring initiative is the development of an appropriate spatial framework. Establishing a spatial framework for monitoring enhances the ability of a program to deal with physical, chemical and biological variability at multiple scales. In addition, the spatial structure creates an organizational system which facilitates the communication of results to managers.

Establishing a spatial framework for estuarine monitoring is more difficult than in the freshwater case because there are few consistent physical boundaries linked to the biology. NOAA has developed a nationwide coastal assessment framework based on hydrologic units (i.e. HUCs) to provide a nationally-consistent mechanism around which environmental information related to coastal areas can be gathered. These spatial units typically represent estuaries and their watersheds, but also can be coastal watersheds that are not considered to be estuaries. Estuarine Drainage Areas (EDAs) are that component of an estuary's watershed that empties directly into the estuary and is affected by tides. EDAs may be composed of a portion of a single hydrologic unit, or several complete hydrologic units and portions of several adjacent hydrologic units. Coastal Drainage Areas (CDAs) are defined as that portion of a watershed that 1) is not part of any EDA; 2) drains directly into an ocean or an estuary; and 3) is composed only of the downstream-most hydrologic unit in which the head-of-tide is found.

The NOAA EDA/CDA framework was used as a basis to establish sampling units for marine inshore monitoring throughout Florida (Figure 1-3). In most cases, these sampling units are combinations of coastal HUCs. Due to the lack of large rivers on the east coast, determination of the sampling units for the St. Johns WMD using HUC-based EDA/CDAs was problematical. The four sampling units in the St. Johns were established based on the natural boundaries of the major estuaries, rather than on EDA/CDAs. The HUC-based definition of sampling units facilitates integrated monitoring and reporting with the freshwater and groundwater components of IWMRN, since their monitoring is also HUC-based.

Thus, a two-tiered, hierarchical spatial framework is established, consisting of sampling units within Water Management Districts. Each year, one sampling unit in each of the five regions will be chosen for sampling. The schedule of activity within sampling units will be chosen to correspond as closely as possible with the freshwater and groundwater component of IWRMN. This will result

in synoptic sampling of all types of water resources, from headwaters to estuary in most cases, within a sampling unit. Within each sampling unit a triangular grid (resulting in hexagonal cells) is randomly placed over the estuarine resources. Cell sizes within each grid are iteratively determined in order to achieve a total of 30 stations per sampling unit. In addition, a broad-scale statewide set of samples (30 each year statewide) is randomly selected from a triangular grid covering the coastline. Thus, a total of 180 stations will be visited each year, 50 in each of five sampling units, plus 30 at the broad (statewide) scale. This sampling design results in the ability to make inferences regarding estuarine condition statewide on an annual basis, and inferences related to WMD on a 4-5 year cycle.

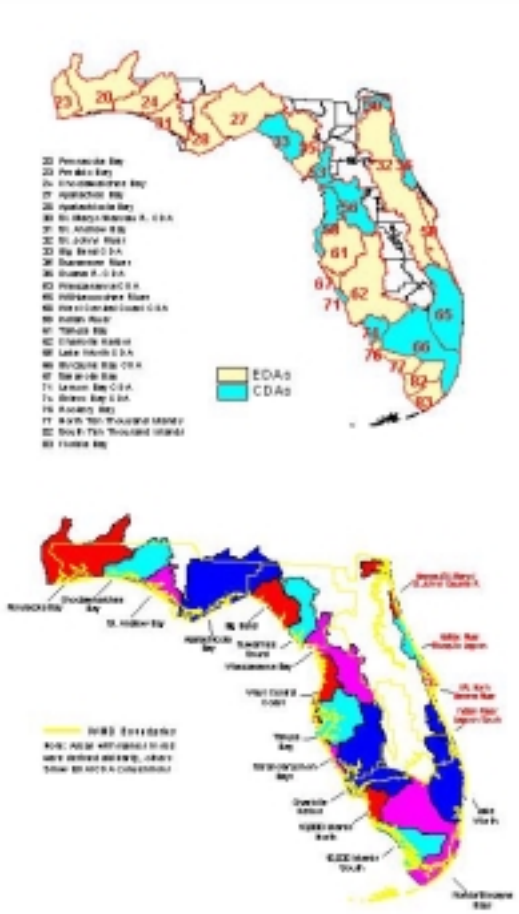

Figure 1-3. Florida Estuarine and Coastal Drainage Areas (top) and IMAP Sampling Units (bottom).

Since there are four sampling units in all WMD but the Suwannee, area-based estimates of estuarine condition within each WMD will be available after five years (all sampling units sampled after four years, plus a resampling of one of the sampling units in year five to generate a variance estimate). Since the Suwannee district has only three sampling units, this WMD will be sampled on a four-year cycle, rather than five, with two of the sampling units resampled in years 4 and 5.

The entire spatial framework will be evaluated as part of year-two activities. The NOAA EDA/CDA classification will be examined more closely and changes to sampling unit boundaries, if necessary, will be negotiated with EPA. As mentioned above, the estuarine delineations established by EMAP-Estuaries will be examined in the context of field logistics. Both minimum samplable depths and the seaward extent of estuaries will be established based on safety concerns.

1.4 Temporal Framework

Conditions in estuaries vary over multiple time scales and no program can simultaneously characterize a large number of ecosystem indicators at very fine time scales. Monitoring programs typically have to make a choice between adequate spatial characterization (large geographic coverage at coarse time scales) or fine-scale temporal resolution (small geographic coverage at fine time scales) based on resource constraints and program objectives. In order to provide annual statewide estimates of estuarine condition, large-scale spatial coverage takes precedence over fine-scale temporal resolution. Therefore, IMAP operates within an index sampling period temporal framework.

Sampling during an index period identifies a confined portion of the year (i.e., an index period) in which sampling will take place. The concept of an index period is rooted in two main tenets. First, the period should be selected such that measured parameters are expected to show the greatest response to anthropogenic stress. Secondly,

within-season variability in the measured parameters should be low during the index period. The EMAP-Estuaries program used a late-summer index period.

In general, Florida experiences a dry season from about October-May and a wet season from June-September. The Panhandle often experiences a secondary wet period in March. To evaluate the suitability of a late-summer index period for Florida, intra- and interannual trends in physical data collected by the FWC/FMRI Fisheries Independent Monitoring (FIM) program were examined. These data were collected under a stratified random sampling design, so sampling bias (e.g. due to fixed stations near river mouths) should be minimal. Figure 1-4 presents smoothed surfaces by month and year for bottom dissolved oxygen, surface temperature, surface salinity and monthly surface salinity standard deviation (SD) from the Tampa Bay FIM data. These surfaces were based on over 3500 stations sampled from 1987-96. Bottom dissolved oxygen values show a consistent seasonal pattern of summer minima between June-August. Likewise, the seasonal warming pattern in Tampa Bay surface waters changed little from 1987-1996 (Figure 1-4). Annual surface temperature maxima occurred in July each year, although June-August temperatures generally differed by less than 3-4°C. The plot of surface salinity reveals little in terms of seasonal pattern (Figure 1-4). Salinity appears to vary across multiple time scales from daily to annually, making generalizations difficult.

Based on the analysis of physical data from Tampa Bay, a summer index period (July-August) seems appropriate for this region since dissolved oxygen levels are typically at their lowest, and thermal stress most pronounced, during this time. Due to the range of latitudes in Florida, it is likely that sampling within a year will progress in a sequential manner within approximately a two-month window. This will allow for the possibility that the index period may occur earlier in northern areas and later in southern areas.

Results from index-period monitoring are inherently spatially-oriented. That is, environmental assessments from this type of data usually are phrased in the following manner : "8% of estuarine area in Florida experienced dissolved oxygen concentrations < 5 mg/L". As additional sampling occurs each year, IMAP's capability to address interannual changes will develop. However, IMAP is primarily designed to address spatial (i.e. provide area-based estimates of condition) trends. Interannual (seasonal) estuarine condition will be addressed using environmental data collected by existing programs. FMRI's Fisheries Independent Monitoring (FIM) program currently samples over 250 sites in Tampa Bay, Charlotte Harbor, Indian River Lagoon and Cedar Key on a monthly basis. Although these samples are fisheries-oriented, the accompanying environmental data (e.g. temperature, dissolved oxygen, secchi depth, salinity, turbidity, bottom type) is useful in a broader estuarine assessment context. The FIM stations, in combination with other programs both within (e.g. shellfish monitoring) and external to FWC, will in effect provide an ad hoc temporal variability (TV) network to assess changes over multiple time scales. Identification of existing sampling programs which can expand the spatial coverage of the TV network will be a focus of year one activities. In addition, the possible supplementation of existing programs to further their effectiveness within the TV network (e.g. adding additional parameters or expanding spatial coverage) will be considered.

1.5 IMAP Indicators

Two levels of estuarine indicators have been identified for IMAP (Table 2-1). Base-level indicators are relatively cost-effective, and expected to be responsive to anthropogenic stress over short time scales. Samples associated with these indicators will be collected at all 180 stations per year. Supplemental indicators are either relatively expensive (in terms of sampling time or analytical costs), responsive over longer time scales, or experimental in nature. Some supplemental indicators will either be sampled only at the statewide scale (i.e., 30 stations per year), or only during only 2-3 years of a five year cycle (Table 1-1). For supplemental indicators which are sampled only at the statewide scale, no WMD-specific inferences will be possible.

BASE INDICATORS	
Parameter	**Sampling Device**
Water Quality	
Temperature	Hydrolab Surveyor
Dissolved Oxygen	Hydrolab Surveyor
Depth	Hydrolab Surveyor
Salinity	Hydrolab Surveyor
pH	Hydrolab Surveyor
Nutrients (NH4, Nox, DIN, TDN, TP, TN, TDP, FRP)	Water Bottle
Chlorophyll a	Water Bottle (depth integrated)
Bottom Type	Visual Inspection
Macrobenthos	Benthic Grab**
Sediment Grain Size	Benthic Grab
Total Organic Carbon, Percent Silt-Clay	Benthic Grab
Submerged Aquatic Vegetation (SAV)	
Species Composition	Visual Inspection
Braun-Blanquet Cover/Abundance	Visual Inspection
Disease	Visual Inspection
Shoot density (live and dead)	Benthic core**
Biomass (above and below-ground)	Benthic core
Leaf blade length/width/shoot-specific leaf area	Benthic core
# leaf scars on lateral shoots	Benthic core
# rhizome apices	Benthic core
Fish	
Relative Abundance	Trawls/Seines
Gross External Pathology	Trawls/Seines
SUPPLEMENTAL INDICATORS	
Sediment Contaminants	Benthic Grab
Contaminant residues in fish	Trawls/Seines
Stable isotopes of nitrogen in fish	Trawls/Seines
Presence of *Pfiesteria*-like organisms in sediments	Benthic Grab

Table 1-1: Estuarine Indicators proposed for Florida's inshore marine monitoring program (IMAP).

1.6 IMAP Sampling Schedule

IMAP samples one sampling unit within each Water Management District each year in addition to 30 sites at the statewide scale. The five year sampling sequence is detailed in Table 1-2 and displayed graphically in Figure 1-4. The remainder of this report summarizes results, to date, from 2000 sampling.

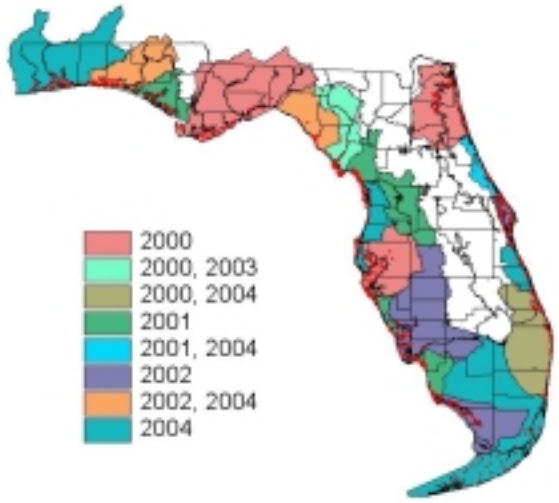

Figure 1-4: Sampling schedule for IMAP sampling units, 2000-2004.

Year				
2000	2001	2002	2003	2004
Nassau/St. Johns/St. Marys	St. Andrew Bay	Choctawhatchee Bay	**West Central Coast**	**Lake Worth**
Apalachicola Bay	Halifax/Mosquito Lagoon	Big Bend	Pensacola Bay	**Halifax/Mosquito Lagoon**
Suwannee Sound	Wacassassa Bay	IRL North/Banana River	Florida/Biscayne Bays	**Choctawhatchee Bay**
Tampa Bay	Sarasota/Lemon Bays	Charlotte Harbor	IRL South	**Big Bend**
Lake Worth	North 10K Islands	South 10K Islands	Suwannee Sound	**West Central Coast**

Table 1-2 Sampling schedule for IMAP sampling units, 2000-2004. Bolded locations are repeat visits.

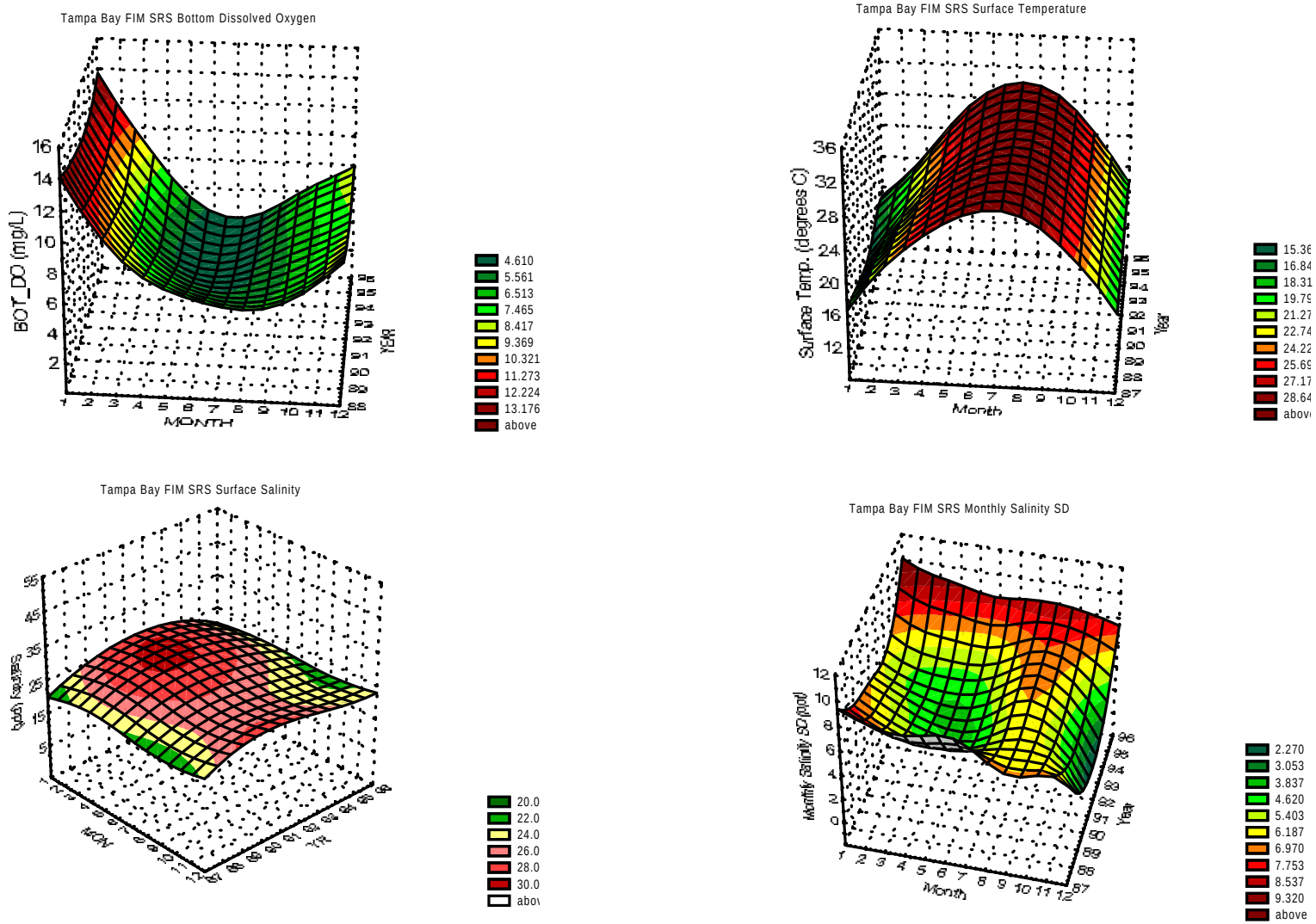

Figure 4. Bottom dissolved oxygen, sea surface temperature, surface salinity, and month standard deviation of surface salinity for the Tampa Bay FIM program 1987-1996.

2 FIELD SAMPLING: 2000

2.1 Field Sampling Logistics

The index period for IMAP sampling in summer 2000 was defined as July-August. However, due to a shortage of Young-Modified Van Veen grabs for benthic sampling, some sampling units were actually sampled in early September. This situation has since been rectified with the purchase of 3 additional grabs. The IMAP program now has a total of 4 benthic grabs which will make scheduling of 2001 sampling much easier. The number of sites visited by week in

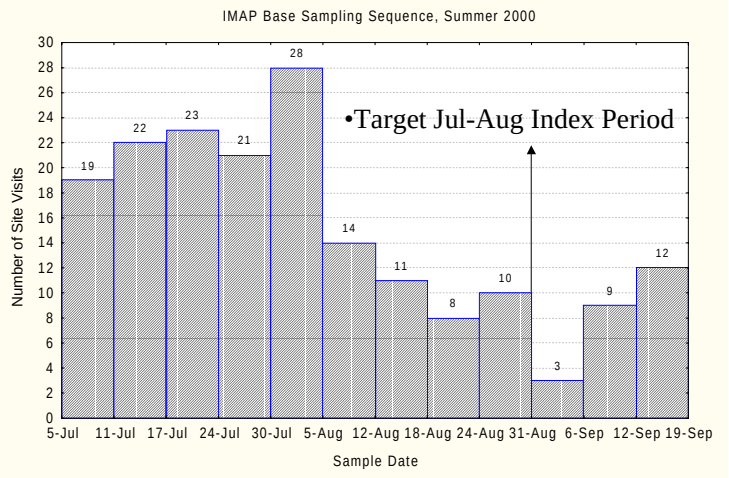

Figure 2-1. Number of IMAP stations sampled by week, Summer. 2000.

2000 is presented in Figure 2-1. Overall, 87% of the stations were sampled within the index period (156 out of 180).

Field crews located stations using either GPS or Differential GPS. In general, field crews were extremely accurate in locating target coordinates for field stations (Table 2-1). Seventy-eight percent of stations were located within 0.03 nm of the target coordinates, while over 90% of stations were located within 0.06 nm of the target.

Sampling responsibilities were distributed as evenly as possible among FMRI field Labs (Figure 2-2). In 2000, the Apalachicola field lab had the highest load at 34 sites, while the Charlotte Harbor lab had the lowest load at only 2 sites. A complete station summary is provided in Table 2-2.

Distance (target vs. actual (nm))	Station Count	Cumul. Count	Percent	Cumul. Percent
0<=x<.010	76	76	43.43	43.43
.010<=x<.020	37	113	21.14	64.57
.020<=x<.030	23	136	13.14	77.71
.030<=x<.040	9	145	5.14	82.86
.040<=x<.050	8	153	4.57	87.43
.050<=x<.060	7	160	4.00	91.43
.060<=x<.070	2	162	1.14	92.57
.070<=x<.080	1	163	0.57	93.14
.080<=x<.090	1	164	0.57	93.71
.090<=x<.130	1	165	0.57	94.29
.130<=x<.160	2	167	1.14	95.43
.160<=x<.190	1	168	0.57	96.00
.190<=x<.220	1	169	0.57	96.57
.220<=x<.260	1	170	0.57	97.14
.260<=x<.370	1	171	0.57	97.71
.370<=x<.460	1	172	0.57	98.29
.460<=x<.810	1	173	0.57	98.86
0.81<=x<1.57	1	174	0.57	99.43
1.57<=x<1.92	1	175	0.57	100.00

Table 2-1: Frequency table of distances between actual and target sampling locations (nm) in IMAP summer 2000 sampling,

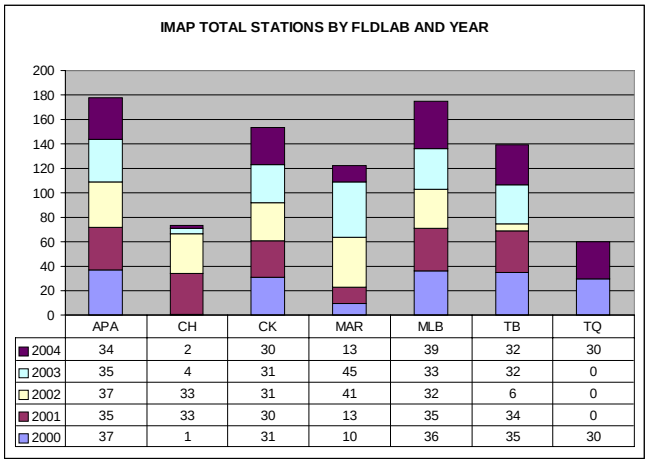

Figure 2-2: IMAP sampling responsibilities by year and FMRI field lab (APA=Apalachicola, CH=Charlotte Harbor, CK=Cedar Key, MAR=Marathon, MLB=Melbourne, TB=Tampa Bay, TQ=Tequesta)

Table 2-2: IMAP station summary for summer 2000 sampling. D = Differential GPS, G=Non-differential GPS. Fish Gear 20=seine; Fish Gear 300=trawl.

WATER MANAGEMENT DISTRICT SCALE STATIONS

STATION	DEPTH(M)	SAMPLE DATE	TIME	FISH TAKEN	FISH GEAR	GPS	GRAB TAKEN	COMMENT
APA200001	0.8	09/08/00	12:09	NO		G	NO	INACCESSIBLE BY BOAT DUE TO OYSTER BARS
APA200002	0.9	09/15/00	12:32	YES	20	G	NO	INACCESSIBLE BY BOAT DUE TO OYSTER BARS
APA200003	1.7	09/15/00	14:05	NO		G	NO	INACCESSIBLE BY BOAT DUE TO OYSTER BARS; TOO DEEP TO SEINE
APA200004	1.3	09/15/00	08:50	YES	20	G	YES	
APA200005	3.3	09/14/00	11:00	YES	300	D	YES	
APA200006	1.2	09/14/01	12:10	YES	20	D	YES	
APA200007	3.0	09/14/00	08:48	YES	300	D	YES	
APA200008	5.1	09/14/00	09:50	YES	300	D	YES	
APA200009	1.5	09/11/00	14:55	YES	300	D	YES	
APA200010	7.0	08/16/00	14:15	YES	300	G	YES	
APA200011	4.7	08/16/00	09:38	YES	300	D	YES	
APA200012	3.6	09/13/00	10:20	YES	300	D	YES	
APA200013	2.1	09/05/00	09:10	YES	300	D	YES	
APA200014	2.6	09/11/00	13:10	YES	300	D	YES	
APA200015	3.4	09/13/00	11:30	YES	300	D	YES	
APA200016	0.9	09/12/00	08:30	NO		D	YES	TOO MUDDY FOR SEINE
APA200017	1.8	08/15/00	10:40	YES	300	D	YES	
APA200018	3.6	09/12/00	13:40	YES	300	D	YES	
APA200019	0.7	09/13/00	09:10	YES	20	D	YES	INACCESSIBLE BY BOAT DUE TO OYSTER BARS
APA200020	0.9	09/12/00	09:15	YES	20	D	YES	
APA200021	2.4	08/15/00	13:54	YES	300	D	YES	
APA200022	3.0	09/06/00	09:34	YES	300	D	YES	
APA200023	1.1	09/13/00	08:00	YES	300	D	YES	
APA200024	2.3	09/12/01	10:40	YES	300	D	YES	
APA200025	2.3	09/06/00	13:10	YES	300	D	YES	
APA200026	2.1	09/12/00	12:14	YES	300	D	YES	
APA200027	3.4	09/11/00	10:20	YES	300	D	YES	
APA200028		08/17/00		NO			NO	NO WATER AT OR NEAR SITE
APA200029	0.1	08/17/00	11:00	NO		G	NO	TOO SHALLOW FOR HYDROLAB/BOAT
APA200030		08/17/00		NO			NO	SITE INACCESSIBLE BY BOAT OR VEHICLE
LKW200001	0.8	07/26/00	14:15	YES	20	G	YES	
LKW200002	2.3	07/26/00	15:10	YES	300	G	YES	
LKW200003	0.7	07/25/00	08:45	YES	20	G	YES	
LKW200004	0.5	07/25/00	12:40	YES	20	G	YES	
LKW200005	0.6	07/25/00	13:45	YES	20	G	YES	HAD TO RELOCATE DUE TO LOW BRIDGE
LKW200006	0.9	07/28/00	08:50	YES	20	G	YES	
LKW200007	3.5	08/02/00	08:00	YES	300	G	YES	
LKW200008	1.7	08/02/00	09:15	YES	300	G	YES	
LKW200009	3.5	08/02/00	11:00	YES	300	G	YES	
LKW200010	2.6	07/27/00	09:00	YES	300	G	YES	
LKW200011	1.8	07/27/00	09:55	YES	300	G	YES	
LKW200012	3.8	07/27/00	10:45	YES	300	G	YES	

LKW200013	2.0	07/27/00	11:55	YES	300	G	YES	
LKW200014	2.5	07/27/00	13:05	YES	300	G	YES	
LKW200015	7.5	08/03/00	08:30	YES	300	G	YES	
LKW200016	0.6	08/03/00	09:20	YES	20	G	YES	
LKW200017	0.7	08/03/00	10:20	YES	20	G	YES	
LKW200018	3.0	08/03/00	11:03	YES	300	G	YES	
LKW200019	2.0	08/03/00	12:02	YES	300	G	YES	
LKW200020	5.5	07/26/00	10:15	YES	300	G	YES	
LKW200021	1.9	08/03/00	12:55	YES	300	G	YES	
LKW200022	2.0	08/04/00	10:48	YES	300	G	YES	
LKW200023	1.3	08/04/00	09:00	YES	20	G	YES	
LKW200024	0.8	08/08/00	12:20	YES	20	G	YES	
LKW200025	3.5	08/08/00	08:45	YES	300	G	YES	
LKW200026	1.4	08/08/00	09:45	YES	20	G	YES	
LKW200027	2.2	08/08/00	10:27	YES	300	G	YES	
LKW200028	2.5	07/26/00	12:15	YES	300	G	YES	
LKW200029	1.1	07/28/00	07:45	YES	20	G	YES	ORIGINAL SITE ON LAND; HAD TO RELOCATE
LKW200030	5.0	08/08/00	13:10	YES	300	G	YES	
NSJ200001	7.0	07/05/00	14:50	YES	300	G	YES	
NSJ200002	0.6	07/05/00	18:05	YES	20		YES	
NSJ200003	1.5	07/05/00	16:45	YES	23		YES	
NSJ200004	0.5	07/18/00	17:25	YES	20		YES	
NSJ200005	2.5	07/18/00	15:26	NO	300		YES	STRONG CURRENT NO TRAWL
NSJ200006	2.0	07/18/00	14:25	YES	300		YES	STRONG CURRENT SHORT TRAWL
NSJ200007	3.5	07/18/00	13:15	YES	300	G	YES	STRONG CURRENT SHORT TRAWL
NSJ200008	1.8	07/06/00	12:30	YES	300		YES	
NSJ200009	10.0	07/07/00	10:40	NO			NO	ORIGINAL SITE IN SHIP CHANNEL; MOVED .05 NM STILL NO FISH OR GRAB DUE TO CURRENTS
NSJ200010	3.0	07/06/00	14:00	YES	300		YES	
NSJ200011	2.0	07/07/00	09:00	YES	300		YES	
NSJ200012	6.0	07/07/00	09:50	YES	300		YES	
NSJ200013	0.8	07/06/00	09:15	YES	20	G	YES	
NSJ200014	0.9	07/07/00	10:55	NO			YES	TOO MUDDY TO SEINE
NSJ200015	2.5	07/11/00	13:41	YES	300		YES	
NSJ200016	0.4	07/11/00	16:25	YES	20	G	YES	
NSJ200017	2.8	07/11/00	12:31	YES	300		YES	
NSJ200018	0.9	07/11/00	09:29	YES	20	G	YES	
NSJ200019	5.0	07/11/00	11:04	YES	300	G	YES	
NSJ200020	2.1	07/12/00	14:10	YES	300		YES	
NSJ200021	6.0	07/12/00	11:33	YES	300	G	YES	
NSJ200022	3.1	07/13/00	10:41	YES	300		YES	
NSJ200023	3.1	07/13/00	11:52	YES	300		YES	
NSJ200024	7.1	07/13/00	12:51	YES	300		YES	
NSJ200025	2.2	07/19/00	10:45	YES	300		YES	
NSJ200026	2.4	07/19/00	11:40	YES	300		YES	
NSJ200027	5.5	07/19/00	12:45	NO	300		YES	NO TRAWL DUE TO MULTIPLE HANGS; NO SUITABLE RELOCATION
NSJ200028	4.0	07/19/00	14:00	YES	300		YES	FOUR GRABS AT ORIGINAL SITE UNSUCCESSFUL

NSJ200029	2.5	07/19/00	15:00	YES	300		YES	
NSJ200030	2.5	07/19/00	16:00	YES	300		YES	
SUW200001	2.7	08/14/00	14:53	NO			NO	SALINITY=0
SUW200002	1.6	07/31/00	12:35	NO	300		YES	NO TRAWL DUE TO ALGAE BYCATCH
SUW200003	1.6	07/31/00	11:25	NO	300		YES	NO TRAWL DUE TO ALGAE BYCATCH
SUW200004	6.0	08/14/00	13:47	NO			NO	SALINITY=0
SUW200005	1.0	07/31/00	10:15	YES	20		YES	
SUW200006	2.2	07/31/00	14:25	YES	300		YES	
SUW200007	1.1	08/02/00	11:39	NO	300	D	YES	NO TRAWL DUE TO ALGAE BYCATCH
SUW200008	1.7	08/01/00	13:57	YES	300		YES	
SUW200009	2.6	08/01/00	12:47	YES	300		YES	
SUW200010	1.7	08/02/00	12:40	YES	300		YES	
SUW200011	1.8	08/01/00	11:38	NO	300		YES	NO TRAWL DUE TO ALGAE BYCATCH
SUW200012	2.1	08/01/00	10:30	YES	300		YES	
SUW200013	2.3	08/01/00	15:16	YES	300		YES	
SUW200014	2.2	08/01/00	09:11	YES	300	G	YES	
SUW200015	2.7	08/08/00	09:37	YES	300	D	YES	
SUW200016	2.0	08/02/00	14:30	YES	300	D	YES	
SUW200017	2.3	08/02/00	16:32	YES	300		YES	
SUW200018	0.7	08/08/00	11:07	YES	20		YES	
SUW200019	0.8	07/28/00	11:35	NO			YES	TOO MUDDY TO SEINE
SUW200020	0.8	07/27/00	13:20	YES	20		YES	
SUW200021	1.5	07/28/00	10:10	YES	300	D	YES	
SUW200022	2.6	07/27/00	12:27	YES	300	D	YES	
SUW200023	1.5	07/28/00	13:15	YES	300		YES	
SUW200024	0.5	08/08/00	12:20	YES	20		YES	
SUW200025	1.4	07/28/00	08:50	YES	300	D	YES	
SUW200026	2.5	08/08/00	14:43	YES	300		YES	
SUW200027	0.3	08/08/00	17:20	YES	20	G	YES	
SUW200028	3.5	08/14/00	12:50	NO			NO	SALINITY=0
SUW200029	1.8	07/31/00	16:05	NO			YES	TOO MUDDY TO SEINE
SUW200030	1.6	08/02/00	10:05	YES	23	D	YES	
TAM200001	1.1	07/14/00	10:02	YES	20		YES	
TAM200002	2.5	07/14/00	14:48	NO	300		YES	NO TRAWL DUE TO ALGAE BYCATCH
TAM200003	4.2	07/20/00	09:01	YES	300	G	YES	
TAM200004	4.5	07/14/00	12:22	YES	300		YES	
TAM200005	2.2	07/13/00	15:05	YES	300	G	YES	
TAM200006	5.3	07/13/00	11:47	YES	300	G	YES	
TAM200007	5.2	07/13/00	10:19	YES	300	G	YES	
TAM200008	2.1	07/18/00	11:46	YES	300	G	YES	
TAM200009	2.3	07/11/00	10:08	YES	300	G	YES	
TAM200010	5.3	07/12/00	13:40	YES	300	G	YES	
TAM200011	1.0	07/20/00	12:28	YES	20	G	YES	
TAM200012	3.8	07/12/00	12:15	YES	300	G	YES	
TAM200013	3.5	07/18/00	15:25	YES	300	G	YES	
TAM200014	5.1	07/12/00	10:49	YES	300	G	YES	
TAM200015	0.5	08/07/00	11:24	NO		G	NO	SITE ON MANGROVE ISLAND; DEP SAMPLE ONLY
TAM200016	4.0	07/11/00	13:09	YES	300	G	YES	SITE RELOCATED; ORIGINAL ON LAND

TAM200017	1.9	07/17/00	12:26	YES	300	G	YES	TOWED WITH CURRENT; TOO MANY BOATS TO TOW AGAINST CURRENT
TAM200018	6.3	08/07/00	10:05	YES	300	G	YES	SITE INSIDE SHIP CHANNEL; RELOCATED FOR SAFETY
TAM200019	3.6	07/17/00	11:09	YES	300	G	YES	
TAM200020	2.0	07/17/00	09:37	YES	300	G	YES	
TAM200021	2.1	07/19/00	13:33	YES	300	G	YES	
TAM200022	1.0	07/17/00	14:07	YES	20	G	YES	
TAM200023	7.1	07/19/00	09:16	YES	300	G	YES	
TAM200024	6.9	07/19/00	10:22	YES	300	G	YES	
TAM200025	10.5	08/07/00	16:30	NO		G	YES	TOO DEEP TO TRAWL
TAM200026	1.0	07/19/00	11:45	YES	20	G	YES	MOVED 0.1 NM FOR ACCEPTABLE GRAB
TAM200027	2.8	07/21/00	12:56	YES	300	G	YES	
TAM200028		07/13/00	10:30	NO			NO	SAMPLED BY SWFWMD; DEP SAMPLES ONLY
TAM200029	2.5	07/18/00	10:00	YES	300	G	YES	
TAM200030		07/13/00	11:45	NO			NO	SAMPLED BY SWFWMD; DEP SAMPLES ONLY

STATE SCALE STATIONS

STATION	DEPTH(M)	DATE	TIME	FISH TAKEN	FISH GEAR	GPS	GRAB TAKEN	COMMENT
STR200001	0.5	08/21/00	10:10	YES	20	G	YES	
STR200002	5.6	08/21/00	13:11	YES	300	G	YES	
STR200003	2.0	09/19/00	13:32	YES	300	G	YES	
STR200004	0.9	08/22/00	14:50	NO		G	NO	INACCESSIBLE BY BOAT DUE TO LOGS
STR200006	4.5	07/12/00	12:41	YES	300		YES	
STR200008	2.0	07/12/00	10:07	YES	300	G	YES	
STR200009	4.4	08/23/00	14:13	YES	300	G	YES	
STR200010	5.4	08/16/00	11:35	YES	300	G	YES	
STR200011	1.4	07/27/00	14:50	YES	20	D	YES	
STR200012	1.6	08/22/00	10:15	YES	300		YES	
STR200014	3.9	07/20/00	10:47	YES	300	G	YES	
STR200015	1.5	08/23/00	10:00	YES	300	G	YES	
STR200016	1.2	07/18/00	14:13	YES	20	G	YES	
STR200018	6.2	08/07/00	15:55	YES	300	G	YES	
STR200019	0.9	07/21/00	10:20	YES	20	G	YES	
STR200020	4.9	08/02/00	10:28	YES	300	G	YES	
STR200021	3.0	08/31/00	16:00	YES	300	D	YES	
STR200022	2.1	08/31/00	10:00	YES	300	D	YES	
STR200023	1.2	08/30/00	13:00	YES	20	D	YES	
STR200025	3.3	08/30/00	11:00	YES	300	D	YES	
STR200026	2.3	08/30/00	18:08	YES	300	D	NO	UNACCEPTABLE GRABS (1-2 CM) DUE TO HARDBOTTOM
STR200027	4.5	08/29/00	17:07	YES	300	D	YES	
STR200028	3.2	08/30/00	16:20	YES	300	D	YES	
STR200029	2.5	08/29/00	15:05	YES	300	D	YES	
STR200030	1.9	08/29/00	11:26	YES	300	D	YES	
STT200005	0.6	07/06/00	10:50	YES	23		YES	
STT200007	4.0	08/23/00	09:58	YES	300	D	YES	
STT200013	2.1	08/22/00	12:55	YES	300	G	YES	
STT200017	0.6	07/11/00	14:07	YES	20	G	YES	

STT200024	2.1	08/31/00	13:01	YES	300	G	YES	

Only three stations, sites 28, 29 and 30 in the Apalachicola sampling unit, were not sampled for any indicators. Site 28 was on land, with no relocation possible within specified distance limits, site 29 was only 10 cm deep, and site 30 was inaccessible by boat or vehicle. A total of five stations (LKW200005, LKW200029, NSJ200009, TAM200016, and TAM200018) were successfully relocated due to accessiblity, safety, not being samplable for certain indicators, or because the original site was on land.

Successful fish samples were obtained at 86% of the sites (155 of 180). Various conditions and situations resulted in a given site being unsamplable for fish including, high algal bycatch, bottom obstructions, unsafe seining conditions, or unsuitable depths (too deep or too shallow). Per IMAP protocol (Appendix C), fish samples were not taken at sites with salinity=0 ppt (n=5 sites).

The IMAP sampling protocol defines a successful benthic grab, in part, based on a sediment depth in the sampler of at least 10 cm. Successful benthic grabs were obtained at 92% of the sites (165 of 180). Various conditions and situations resulted in a given site being unsamplable for benthos including hardbottom, inaccessility, or high currents. Per IMAP protocol, benthos samples were not taken at sites with salinity=0 ppt (n=5 sites).

Water quality samples with automated monitoring equipment were obtained at all but the three sites mentioned as not being samplable above.

Sediment chemistry samples were successfully taken at 28 of 30 statewide scale sites. Site STR200004 was inaccessible and site STR200026 was not samplable due to hardbottom. Sediment samples for bioassays for *Pfiesteria*-like dinoflagellates were taken at 27 of the state scale sites.

2.2 Water Quality and Physical Indicators

Water quality parameters in IMAP sampling are taken using automated water quality instruments (depth, temperature, pH, conductivity, salinity, dissolved oxygen), and through laboratory measurements on water samples (chla, turbidity, color and nutrients). Figure 2-3 summarizes water quality data by each sampling unit and scale for depth, temperature, salinity, and dissolved oxygen. The mean station depth across all stations was 2.6 m. The Tampa Bay stations were, on average, the deepest with a mean depth of 3.5 m. Suwannee River had the shallowest sites, with a mean depth of 1.9 m. Among the six geographic groupings used in Figure 2-3, depth differences were significant (ANOVA, F=3.07, 172 df, p=0.01), although much of this difference is due to pairwise disparity between Tampa Bay and Suwannee sites (Tukeys HSD, p=0.01 for this pair, all otherwise pairwise HSDs had p>0.08).

DISSOLVED OXYGEN (MG/L)				
	df	MS	F	p-level
SAMPUNIT	5	5.81	3.75	0.0026
SAMPDEP	1	19.30	12.46	0.0005
SAMPUNIT*SAMPDEP	5	1.66	1.07	0.3744
TEMPERATURE (C)				
	df	MS	F	p-level
SAMPUNIT	5	15.17	6.36	0.0000
SAMPDEP	1	6.94	2.91	0.0892
SAMPUNIT*SAMPDEP	5	2.87	1.20	0.3075
SALINITY (PPT)				
	df	MS	F	p-level
SAMPUNIT	5	956.25	12.73	0.0000
SAMPDEP	1	24.39	0.32	0.5692
SAMPUNIT*SAMPDEP	5	35.69	0.48	0.7946

Table 2-3: Results of two way Analysis of Variance for dissolved oxygen, temperature, and salinity IMAP sampling summer, 2000. Analyses are on raw station data across all scales. SAMPUNIT = sampling units as depicted in Figure 2-3. SAMPDEP= sample depth (surface or bottom).

ANOVA results for three additional water quality parameters are listed in Table 2-3. Dissolved oxygen, temperature, and salinity were all significantly different among sampling units. Surface vs. Bottom differences were only significant for dissolved oxygen (Table 2-3). Very

little stratification was evident in 2000 sampling, as indicated by the nonsignificant differences in

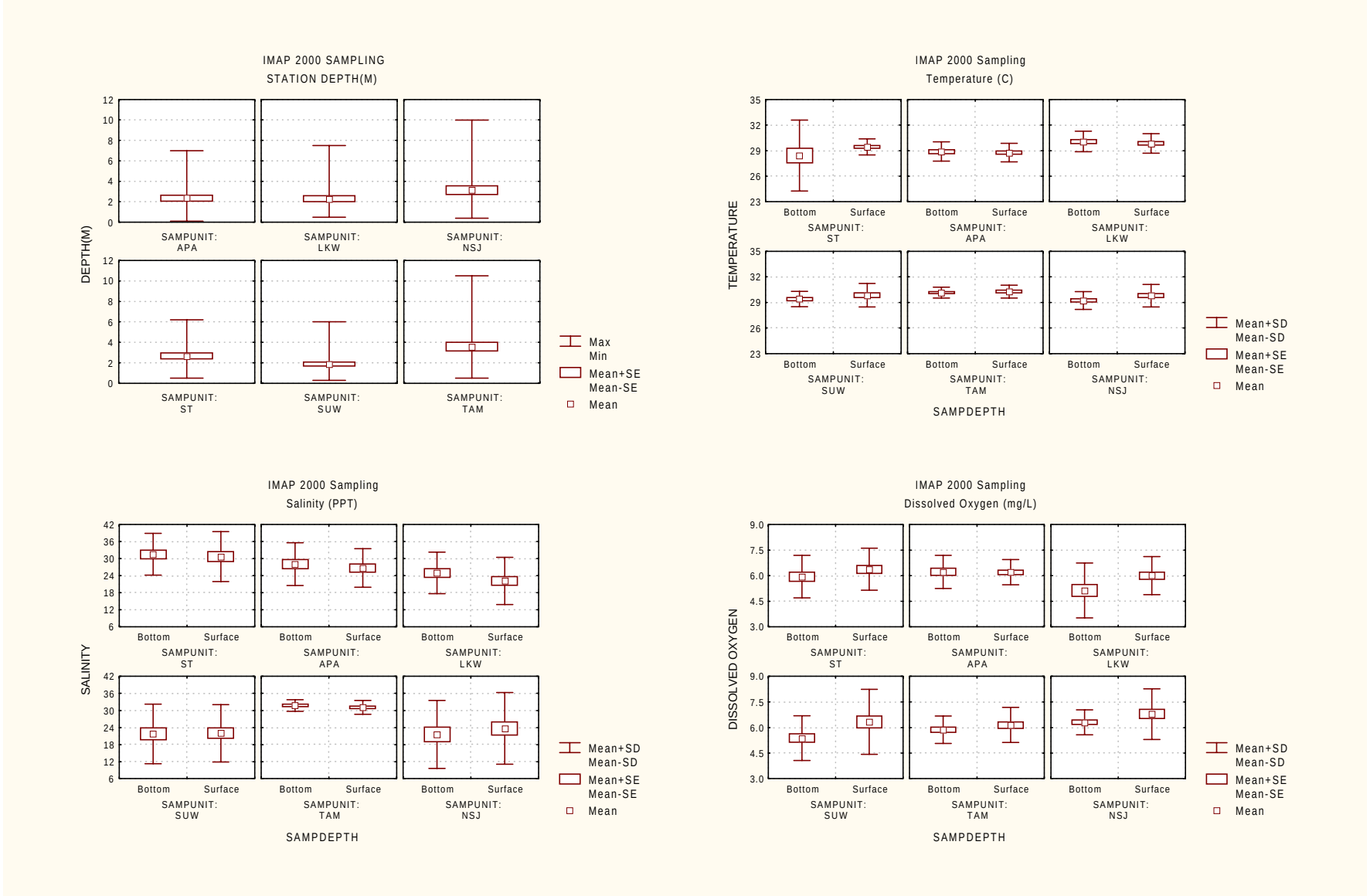

Figure 2-3. Water Quality results from IMAP sampling Summer, 2000 (ST=State Scale Stations; APA=Apalachicola, LKW=Lake Worth; SUW=Suwannee River; TAM=Tampa Bay; NSJ=Nassau, St. Marys, St. Johns Rivers)

temperature and salinity by sample depth and the lack of an interaction between SAMPUNIT and SAMPDEP. Complete water quality data from Hydrolab sampling is presented in Appendix A, Table A-1.

2.3 Sediment Quality Indicators

In IMAP, sediment quality is assessed using the variables total organic carbon (TOC) in sediment, sediment grain size, and sediment chemistry (contaminants). TOC and grain size were measured at all sites, while sediment chemistry was measured only at the state scale stations. As of this writing, only a portion of the results are available for TOC (147 out of 165 samples) and grain size. Using the available data, there is

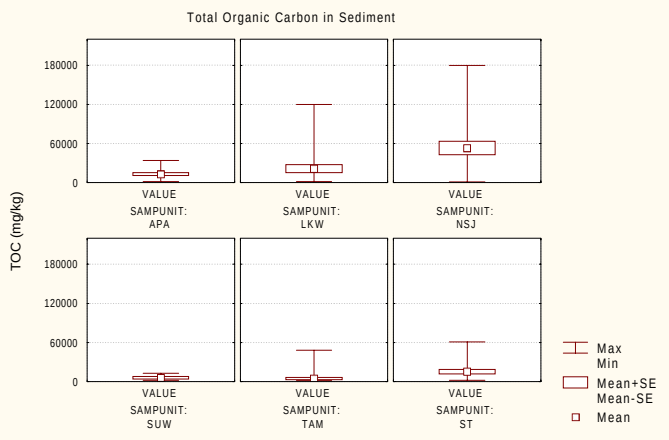

Figure 2-4: Total Organic Carbon in sediment. IMAP sampling Summer, 2000 (ST=State Scale Stations; APA=Apalachicola, LKW=Lake Worth; SUW=Suwannee River; TAM=Tampa Bay; NSJ=Nassau, St. Marys, St. Johns Rivers)

clearly a significant variation in the mean TOC of sediments among sampling units (Figure 2-4).

Highest mean TOC values were observed within the NSJ and LKW sampling units on the east coast. Lowest mean TOC values were observed in the TAM and SUW sampling units on the west coast, however, only 5 of 27 samples have been analyzed from SUW. Complete TOC results to date are tabled in Appendix A, Table A-2.

As of this writing sediment grain size data are available from only 56 of 165 samples. As a result, summarization of this parameter is best delayed to a later report.

As noted above, in the IMAP sampling design, sediment chemistry samples are taken only at the statewide sampling scale. Sediment samples were examined for over 150 metal and organic contaminants (Appendix A, Table A-3).

For mercury, 24 of 28 stations had concentrations below minimum laboratory practical quantitation levels (PQL; Table 2-5).

STATION	HG (mg/kg)
STR200002	0.100
STR200006	0.062
STR200008	0.280
STT200005	0.100

Table 2-5: Mercury in sediments (mg/kg) from IMAP sampling Summer, 2000. Only values above detectable limits are presented.

The first site listed in Table 2-5 is in Pensacola Bay, near Gulf Breeze. The remaining three sites are in the St. Johns River. Site STT200005 is in Brown's Creek in the lower part of the river. Sites STR200006 and STR200008 are near the Jacksonville Naval Air Station. Site STR200008 was the only site where mercury concentrations exceed the Threshold Effects Level (TEL) for mercury which is 0.13 mg/kg (MacDonald, 1994). No mercury concentrations exceed the Probable Effects Level (PEL) for of 0.696. Concentrations of contaminants above the TEL have the potential to initiate adverse biological effects.

Detectable levels of the remaining metals were documented at 15 of the 28 stations (Table 2-6). However, only five sites had one or more metals exceed TEL concentrations. These five sites occurred in the St. Johns River, Pensacola Bay, and Florida Bay (Figure 2-5). Arsenic exceeded TEL levels at one site each in Pensacola and Florida Bays. Chromium, lead and nickel levels exceeding the TEL were observed at two sites in the St. Johns River, and in Pensacola Bay. Elevated copper levels were found at the two St. Johns River sites and one of the Florida Bay sites (Figure 2-5). Complete results for metals appear in Appendix table A-4.

STATION	PARAMETER	VALUE (mg/kg)	CODE	TEL (mg/kg)	PEL (mg/kg)	>DETECT?	>TEL?	>PEL?
STR200002	Arsenic	15.3	J	7.24	41.6	Y	Y	
STR200002	Chromium	80.6		52.3	160	Y	Y	
STR200002	Copper	12.8		18.7	108	Y		
STR200002	Lead	35.1		30.2	112	Y	Y	
STR200002	Nickel	22.4		15.9	42.8	Y	Y	
STR200006	Chromium	24.0		52.3	160	Y		
STR200006	Lead	27.0		30.2	112	Y		
STR200006	Nickel	5.9		15.9	42.8	Y		
STR200008	Cadmium	0.7		0.676	4.21	Y		
STR200008	Chromium	66.0		52.3	160	Y	Y	
STR200008	Copper	23.3		18.7	108	Y	Y	
STR200008	Lead	55.9		30.2	112	Y	Y	
STR200008	Nickel	17.3		15.9	42.8	Y	Y	
STR200015	Chromium	15.8		52.3	160	Y		
STR200022	Cadmium	0.2		0.676	4.21	Y		
STR200023	Arsenic	9.2	J	7.24	41.6	Y	Y	
STR200023	Cadmium	0.4		0.676	4.21	Y		
STR200023	Chromium	18.4		52.3	160	Y		
STR200023	Nickel	5.6		15.9	42.8	Y		
STR200025	Cadmium	0.3		0.676	4.21	Y		
STR200025	Copper	81.2		18.7	108	Y	Y	
STR200025	Nickel	6.3		15.9	42.8	Y		
STR200027	Cadmium	0.3		0.676	4.21	Y		
STR200028	Cadmium	0.3		0.676	4.21	Y		
STR200029	Cadmium	0.3		0.676	4.21	Y		
STR200030	Arsenic	6.9	J	7.24	41.6	Y		
STR200030	Cadmium	0.3		0.676	4.21	Y		
STT200005	Arsenic	5.6	J	7.24	41.6	Y		
STT200005	Cadmium	0.3		0.676	4.21	Y		
STT200005	Chromium	72.0		52.3	160	Y	Y	
STT200005	Copper	20.0		18.7	108	Y	Y	
STT200005	Lead	36.0		30.2	112	Y	Y	
STT200005	Nickel	23.5		15.9	42.8	Y	Y	
STT200013	Cadmium	0.2		0.676	4.21	Y		
STT200013	Chromium	15.9		52.3	160	Y		
STT200013	Lead	12.1		30.2	112	Y		
STT200013	Nickel	4.8		15.9	42.8	Y		
STT200017	Copper	18.0		18.7	108	Y		
STT200024	Cadmium	0.3		0.676	4.21	Y		

Table 2-6: Metals in sediments (mg/kg) from IMAP sampling Summer, 2000. Only observations above the laboratory practical quantitation limit are listed. Code definition: J = estimated value. TEL = Threshold Effects Level; PEL = Probable Effects Level as defined in MacDonald, 1994.

Figure 2-5: State scale stations with one or more metals exceeding TEL limits, IMAP Sampling summer 2000. Metals listed near each station are those for which concentrations exceeded the TEL. Site STR200008 also exceeded the TEL for mercury. See text for additional explanation.

The vast majority of organic compounds for which we analyzed were below laboratory practical quantitation levels. In fact, out of a total of 3707 individual measurements across stations, only 2 (0.05%) were above laboratory detection limits (Table 2-7).

Site STT200005, located in the St. Johns River, had detectable amounts of phenol in sediment samples. This is likely related to current or past industrial activity in the area. Site STR200029 had high levels of Bis(2-ethylhexyl)phthalate, also known as DEHP, in sediments. In fact, the measured concentration of 3300 ug/kg exceeds published PEL levels (2647 ug/kg) for this compound (MacDonald, 1994). DEHP is used in the production of polyvinyl chloride (PVC), where it is added to plastics to make them flexible. The high levels of DEHP at this site is a bit puzzling. Site STR200029 is in the Florida Keys, just outside the boundary of the Great White Heron National Wildlife Refuge. We are examining laboratory blanks to verify this concentration measurement.

STATION	PARAMETER	VALUE (ug/kg)
STR200029	Bis(2-ethylhexyl)phthalate	3300
STT200005	Phenol	2600

Table 2-7: IMAP sites with sediment organics greater than laboratory detection limits, summer 2000.

2.3 Biological Indicators

Several biologically-based indicators were sampled in summer 2000 including fish and selected macroinvertebrates, benthic infauna, submerged aquatic vegetation, and *Pfiesteria*-like cysts in sediments. As of this writing, all of the biological data is complete, with the exception of the benthic infauna and SAV data. To date, enumerated benthic infauna have been received for the Tampa Bay, Nassau/St. Marys/St. Johns, and the Suwannee River Sampling units. Only qualitative information is available on SAV as of this writing.

2.3.1 Fish and Selected Invertebrates

IMAP successfully sampled fish at 155 out of 180 stations in 2000. A total of 162 species, and 20,594 fish were identified and enumerated statewide. Depending on the depth (1 m cutoff), fish were sampled with either seines or trawls (Figure 2-6).

Out of a total of 155 successful sets, 39 were with seines (25%), while 116 (75%) were with trawls. The relatively deep stations in Tampa Bay resulted in more trawl deployments, while the shallow nature of many Lake Worth sites resulted in a larger proportion of seine sets.

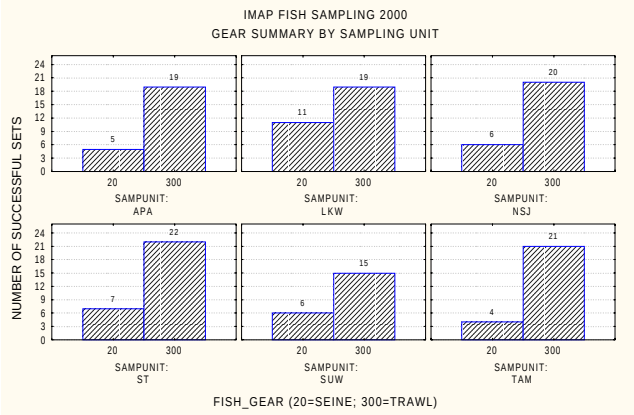

Figure 2-6: Distribution of fish sampling gear type by sampling unit, IMAP sampling summer 2000.

Table A-5 in the appendix summarizes the composition of IMAP fish samples. Table 2-8 lists the most commonly caught species by sampling unit. Sand Seatrout (Cynoscion arenarius), pinfish (Lagodon rhomboides), bay anchovy (Anchoa mitchilli), and species of mojarra (Eucinostomus spp.) were quite common statewide.

Number of species caught in seines and trawls is depicted in Figure 2-7.

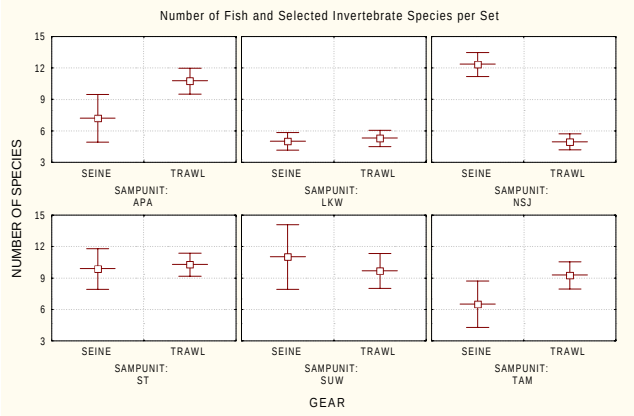

Figure 2-7: Number of species per set by gear and sampling unit, IMAP sampling summer 2000. Lines are means; whiskers max/min.

On average across gear type, samples from Lake Worth contained significantly fewer species than either the state scale or Suwannee River (Tukey's HSD, $p<.05$). Taken across all sampling units, there was no significant difference in number of species per set due to gear type. However, site-specific differences in number of species by gear type were evident in the APA and NSJ sampling units. Trawls tended to catch more species than seines in APA, while the converse was true in NSJ.

2.3.1 Benthic Macroinvertebrates

As of this writing, benthic community data is available for the Tampa Bay, Suwannee River and Nassau/St. Marys/St. Johns River sampling units and 12 state scale stations. As stated above, successful grabs were obtained at 165 of 180 stations. Over 460 unique taxa have been identified in data received to date. This number will likely increase as more results are submitted.

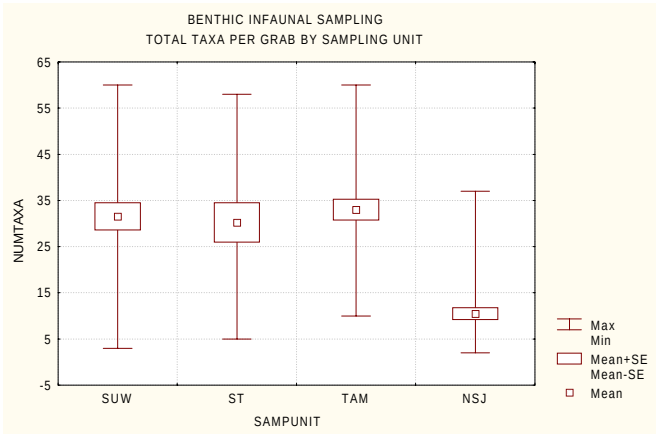

Figure 2-8: Number of species per benthic grab by sampling unit, IMAP sampling summer 2000. State scale data is incomplete (12 of 28 stations received).

Figure 2-8 summarizes the benthic infauna data received to date in terms of number of unique taxa per grab. Except for NSJ, the range of total species composition was remarkably similar among the SUW, ST, and TAM (approximately 5-60 taxa per grab). Lowest mean number of of taxa per grab occurred in northeast Florida (NSJ sampling unit). To date, the highest number of taxa per grab enumerated is 60 (sites SUW200024 and TAM200025). The lowest number of taxa per grab was 2 (site NSJ200018).

In the Suwannee River sampling unit, the most abundant macroinvertebrate was the amphipod *Ampelisca holmesi*, however this species occurred at only 50% of the SUW stations. The most frequently sampled macroinvertebrate in the SUW unit were Tubificid Oligochaetes (Tubificidae), which occurred at 82% of the sites, and were second, in terms of total abundance, to *A. holmesi.*

Another amphipod, *Cerapus* spp., was the most abundant organism overall in Tampa Bay samples. Individuals of this genus were found at 44% of the TAM sites. The most frequently found infaunal taxa in Tampa Bay were Nemertean worms, which occurred at 74% of the sites sampled.

In the NSJ sampling unit, the most abundant benthic taxa overall was the mussel, *Mytilopsis leucophaeata*, however, this species occurred at only 14% of the sites sampled and the majority of

SAMPUNIT	SCIENTIFIC NAME	NUMSETS	MNABUN	PCTSETS	TOTALAB
APA	*Cynoscion arenarius*	19	16.89	0.79	321
APA	*Etropus crossotus*	13	9.77	0.54	127
APA	*Menticirrhus americanus*	13	4.69	0.54	61
APA	*Anchoa mitchilli*	12	401.25	0.50	4815
APA	*Chloroscombrus chrysurus*	11	14.45	0.46	159
APA	*Lagodon rhomboides*	10	8.20	0.42	82
APA	*Farfantepenaeus spp.*	10	3.80	0.42	38
APA	*Symphurus plagiusa*	10	2.10	0.42	21
LKW	*Eucinostomus spp.*	17	9.47	0.57	161
LKW	*Farfantepenaeus duorarum*	13	2.85	0.43	37
NSJ	*Anchoa mitchilli*	21	22.29	0.75	468
NSJ	*Callinectes sapidus*	17	1.24	0.61	21
NSJ	*Farfantepenaeus duorarum*	16	6.50	0.57	104
ST	*Eucinostomus gula*	20	6.45	0.69	129
ST	*Eucinostomus spp.*	18	15.67	0.62	282
ST	*Lagodon rhomboides*	17	17.24	0.59	293
SUW	*Cynoscion arenarius*	17	43.53	0.81	740
SUW	*Menticirrhus americanus*	15	18.00	0.71	270
SUW	*Farfantepenaeus spp.*	12	18.00	0.57	216
SUW	*Callinectes sapidus*	12	3.67	0.57	44
SUW	*Anchoa mitchilli*	11	143.73	0.52	1581
SUW	*Lagodon rhomboides*	11	7.91	0.52	87
SUW	*Eucinostomus gula*	10	5.60	0.48	56
SUW	*Chloroscombrus chrysurus*	10	2.80	0.48	28
SUW	*Dasyatis sabina*	10	1.50	0.48	15
SUW	*Etropus crossotus*	9	10.00	0.43	90
SUW	*Bairdiella chrysoura*	9	8.56	0.43	77
TAM	*Prionotus scitulus*	24	5.70	0.92	137
TAM	*Lagodon rhomboides*	15	23.80	0.58	357
TAM	*Eucinostomus spp.*	14	12.64	0.54	177
TAM	*Cynoscion arenarius*	14	7.00	0.54	98
TAM	*Anchoa mitchilli*	11	69.09	0.42	760
TAM	*Orthopristis chrysoptera*	11	19.45	0.42	214
TAM	*Chilomycterus schoepfi*	11	9.82	0.42	108
TAM	*Syngnathus louisianae*	11	1.91	0.42	21
TAM	*Synodus foetens*	11	1.64	0.42	18

Table 2-8: Fish and selected invertebrate species occurrring in at least 40% of sets, by sampling unit in IMAP sampling summer 2000. NUMSETS=number of sets by sampling unit in which the listed species was caught; MNABUN=mean abundance per set; PCTSETS=percent of total sets by sampling unit containing the listed species; TOTALAB=total number of individuals caught by species and sampling unit. SAMPUNIT = Sampling Unit (ST=State Scale Stations; APA=Apalachicola, LKW=Lake Worth; SUW=Suwannee River; TAM=Tampa Bay; NSJ=Nassau, St. Marys, St. Johns Rivers)

these animals were found at one site (NSJ200029). The second-most abundant taxa in the NSJ unit was the spioinid polychaete *Streblospio*, which *Streblospio*, along with the bivalve *Tellina*, were the most commonly sampled taxa in the NSJ unit (both found at 55% of sites).

2.3.1 *Pfiesteria*-like Dinoflagellates

IMAP is exploring the use of dinoflagellate cysts in sediment as an ecoindicator. In summer 2000 sampling, state scale sediment samples were inoculated with algae (*Rhodomonas*) in the lab over a period of weeks to induce any resting dinoflagellate cysts to complete their life cycle. Samples were routinely examined during the incubation phase for free-swimming life stages. When found and thought to be unknown or known *Pfiesteria*-like dinoflagellates, the samples were fixed for examination via scanning electron micropscopy (SEM). Table 2-9 presents results to data for the *Pfiesteria*-like indicator. A total of 27 stations were examined in replicate with the *Rhodomonas* bioassay. Unknown *Pfiesteria*-like dinoflagellates were found at two sites STT200005 and STR200006, both in the St. Johns River. It is important to note that positive identification of these organisms awaits examination by SEM. All positive samples are currently being re-run to verify results (Table 2-9).

2.3.1 *Submerged Aquatic Vegetation*

Sampling for submerged aquatic vegetation (SAV) during summer 2000 took place in September-October, following identification of SAV presence qualitatively during base IMAP sampling. Base IMAP sampling identified a total of 38 sites where SAV was present (Figure 2-9). SAV was noted through a combination of visual observations and plant material in fish gear and benthic grabs. Table 2-10 details qualitative SAV information from IMAP sampling in fall 2000. Detailed information on SAV cover/abundance, shoot density, and demographic characteristics is currently being compiled and will be available shortly.

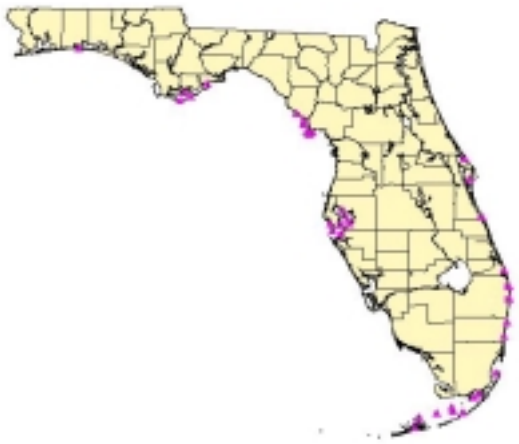

Figure 2-9: IMAP SAV sampling sites summer 2000 (n=38).

Table 2-9: Results for Pfiesteria-like dinoflagellate bioassays, IMAP sampling summer 2000. See text for explanation.

	Date	Date	Total Days	Date	Type		Redo	Incubation
Station	Collected	Incubated	Incubated	Fixed	Fix	Species	Sample	Discontinued
STR200001	08/21/00	08/22/00	104	not fixed			no	12/05/00
STR200001	08/21/00	08/22/00	133	08/31/00	lugols/pfma	diatoms	no	01/04/01
STR200001	08/21/00	08/22/00	133	09/13/00	lugols/pfma	Rhodomonas	no	01/04/01
STR200001	08/21/00	08/22/00	133	11/02/00	lugols/pfma	cryptoperidiniopsoid	no	01/04/01
STR200002	08/21/00	08/22/00	59	09/07/00	lugols/pfma	diatoms	no	10/20/00
STR200002	08/21/00	08/22/00	59	09/19/00	lugols/pfma	cryptoperidiniopsoid	no	10/20/00
STR200002	08/21/00	08/22/00	45	09/12/00	lugols/pfma	cryptoperidiniopsoid	no	10/06/00
STR200006	07/12/00	07/13/00	173	07/24/00	lugols/pfma	loaded with Rhodomonas	no	01/05/01
STR200006	07/12/00	07/13/00	173	10/22/01	lugols/pfma	cryptoperidiniopsoid	no	01/05/01
STR200006	07/12/00	07/13/00	87	08/25/00	lugols/pfma	few Pfiesteria-like, Rhodomonas	yes	10/09/00
STR200007	08/23/00	08/24/00	102	not fixed			no	12/05/00
STR200007	08/23/00	08/24/00	102	not fixed			no	12/05/00
STR200008	07/12/00	07/13/00	98	07/28/00	lugols/pfma	unidentifiable cell	yes	10/20/00
STR200008	07/12/00	07/13/00	98	07/26/00	lugols/pfma	no good cells	yes	10/20/00
STR200009	08/23/00	08/24/00	102	not fixed			no	12/05/00
STR200009	08/23/00	08/24/00	150	not fixed			yes	01/23/01
STR200010	08/16/00	08/18/00	109	not fixed			no	12/05/00
STR200010	08/16/00	08/18/00	109	not fixed			no	12/05/00
STR200011	07/27/00	07/31/00	176	10/18/00	lugols/pfma	?	no	01/23/01
STR200011	07/27/00	07/31/00	176	01/05/01	lugols/pfma	Lucy	no	01/23/01
STR200011	07/27/00	07/31/00	177	not fixed			yes	01/24/01
STR200012	08/22/00	08/23/00	103	not fixed			no	12/05/00
STR200012	08/22/00	08/23/00	103	not fixed			no	12/05/00
STR200013	08/22/00	08/23/00	103	not fixed			no	12/05/00
STR200013	08/22/00	08/23/00	119	not fixed			yes	12/21/00
STR200015	08/23/00	08/24/00	102	not fixed			yes	12/05/00
STR200015	08/23/00	08/24/00	102	not fixed			no	12/05/00
STR200016	07/18/00	07/19/00	153	not fixed			yes	12/21/00
STR200016	07/18/00	07/19/00	137	not fixed			yes	12/05/00
STR200018	08/07/00	08/08/00	97	not fixed			no	11/14/00
STR200018	08/07/00	08/08/00	97	not fixed			no	11/14/00
STR200019	07/21/00	07/21/00	134	not fixed			yes	12/05/00
STR200019	07/21/00	07/21/00	89	not fixed			no	10/20/00
STR200020	08/02/00	08/03/00	90	not fixed			no	11/02/00
STR200020	08/02/00	08/03/00	139	10/24/00	lugols/pfma	cryptoperidiniopsoid-like	yes	12/21/00
STR200021	08/31/00	09/05/00	95	not fixed			no	12/05/00
STR200021	08/31/00	09/05/00	95	not fixed			no	12/05/00
STR200022	08/31/00	09/05/00	ongoing	03/15/01	lugols/pfma	cryptoperidiniopsoid?	yes	ongoing
STR200022	08/31/00	09/05/00	95	not fixed			no	12/05/00
STR200023	08/30/00	09/01/00	89	not fixed			no	11/29/00
STR200023	08/30/00	09/01/00	136	not fixed			yes	01/16/01
STR200024	08/31/00	09/05/00	95	not fixed			no	12/05/00
STR200024	08/31/00	09/05/00	95	not fixed			no	12/05/00
STR200025	08/30/00	09/01/00	89	not fixed			no	11/29/00
STR200025	08/30/00	09/01/00	136	not fixed			no	01/16/01

STR200026	08/30/00	09/01/00	89	not fixed			no	11/29/00
	Date	Date	Total Days	Date	Type		Redo	Incubation
Station	Collected	Incubated	Incubated	Fixed	Fix	Species	Sample	Discontinued
STR200026	08/30/00	09/01/00	89	not fixed			no	11/29/00
STR200027	08/29/00	08/31/00	96	not fixed			no	12/05/00
STR200027	08/29/00	08/31/00	96	not fixed			no	12/05/00
STR200028	08/30/00	09/01/00	136	not fixed			yes	01/16/01
STR200028	08/30/00	09/01/00	89	not fixed			no	11/29/00
STR200029	08/29/00	08/31/00	96	not fixed			no	12/05/00
STR200029	08/29/00	08/31/00	96	not fixed			no	12/05/00
STR200030	08/29/00	08/31/00	125	12/12/00	lugols/pfma	cryptoperidiniopsoid	no	01/04/01
STR200030	08/29/00	08/31/00	96	not fixed			no	12/05/00
STT200005	07/06/00	07/07/00	149	07/14/00	lugols/pfma	lots of unidentifiable Pfiesteria-like	yes	12/05/00
STT200005	07/06/00	07/07/00	149	09/14/00	lugols/pfma	Rhodomonas	no	12/05/00
STT200005	07/06/00	07/07/00	93	07/14/00	lugols/pfma	unidentifiable Pfiesteria-like	yes	10/09/00
STT200017	07/11/00	07/12/00	134	not fixed			yes	11/25/00
STT200017	07/11/00	07/12/00	88	not fixed			no	10/09/00

Station	Salinity	SAV %	SAV Comments
APA200006	29.8	75	Halodule
APA200014	14	50	dead ruppia in grabs
APA200023	33.4	0	dead Halodule in trawl
APA200026	33	25	Halodule
LKW200007	30.5	50	Halophila
LKW200008	31.8	50	Halodule wrightii
LKW200011	30.3	100	Halodule wrightii
LKW200016	18.9	50	Halophila
LKW200017	17.4	50	Halodule wrightii & Halophila
LKW200023	26.7	50	Halophila
LKW200024	26	100	Halophila
STR200003	29.4	75	
STR200012	42	30	Halodule wrightii
STR200015	38.2	100	Syringodium filiforme
STR200021	37.6	30	Thalassia testudinum and algae
STR200022	31.9	100	
STR200023	39.1	100	Thalassia testudinum
STR200026	35.8	0	Syringodium, algae and sponges
STR200027	37.3	100	Syringodium filiforme and algae
STR200028	37.7	100	Syringodium filiforme
STR200029	36.1	100	Thalassia testudinum and algae
STR200030	35.7	100	Thalassia testudinum and algae
STT200013	26.4	100	Caulerpa
STT200024	32.5	100	
SUW200003	20.9	100	Halophila, red and green drift algae
SUW200010	26.3	100	mixed grasses and algae
SUW200022	32	0	drift reds and Halodule wrightii
SUW200024	31.7	100	Syringodium
SUW200025	30.1	100	Syringodium filiforme
SUW200027	31.2	100	?
SUW200029	6.4	50	Vallisenaria
TAM200002	31.1	100	algae (?)
TAM200011	31.2	50	Halodule wrightii, algae
TAM200015	23.7	50	Only DEP samples collected
TAM200017	33.8	100	Halodule wrightii, Thalassia testudinum, Syringodium filiforme
TAM200019	33.8	100	Syringodium filiforme, Thalassia testudinum
TAM200022	33.9	100	
TAM200026	32.2	90	

Table 2-10: Qualitative SAV information from IMAP summer 2000 sampling.

3 DATA MANAGEMENT AND INFORMATION SYSTEMS

Data management is a critical component of IMAP. As part of the data management activities within the project, we have developed a customized database in Microsoft Access. Complete metadata documentation of the fields included in the database is provided in Appendix B. Some key features of the database will be briefly described in this section.

3.1 IMAP Database

The IMAP database uses a master key made up of station location and sample date to link a series of tables containing specific types of environmental observations and measurements. Figure 2-10 lists the relationships among the tables in the IMAP Access Database. More detailed information on fields and functions in the database is available in Appendix B. The master table contains the fields required for all stations. This table is linked through the masterkey to separate table for water samples, sediment grabs, seines, trawls, fish species enumeration and lengths, SAV composition, SAV morphology and demographics, hydrolab parameters, weather parameters, and sediment chemistry.

All required codes, including scientific names of fish species, are available in pull down lists to minimize entry errors. A screenshot of the IMAP graphical user interface (GUI) is presented in Figure 2-11.

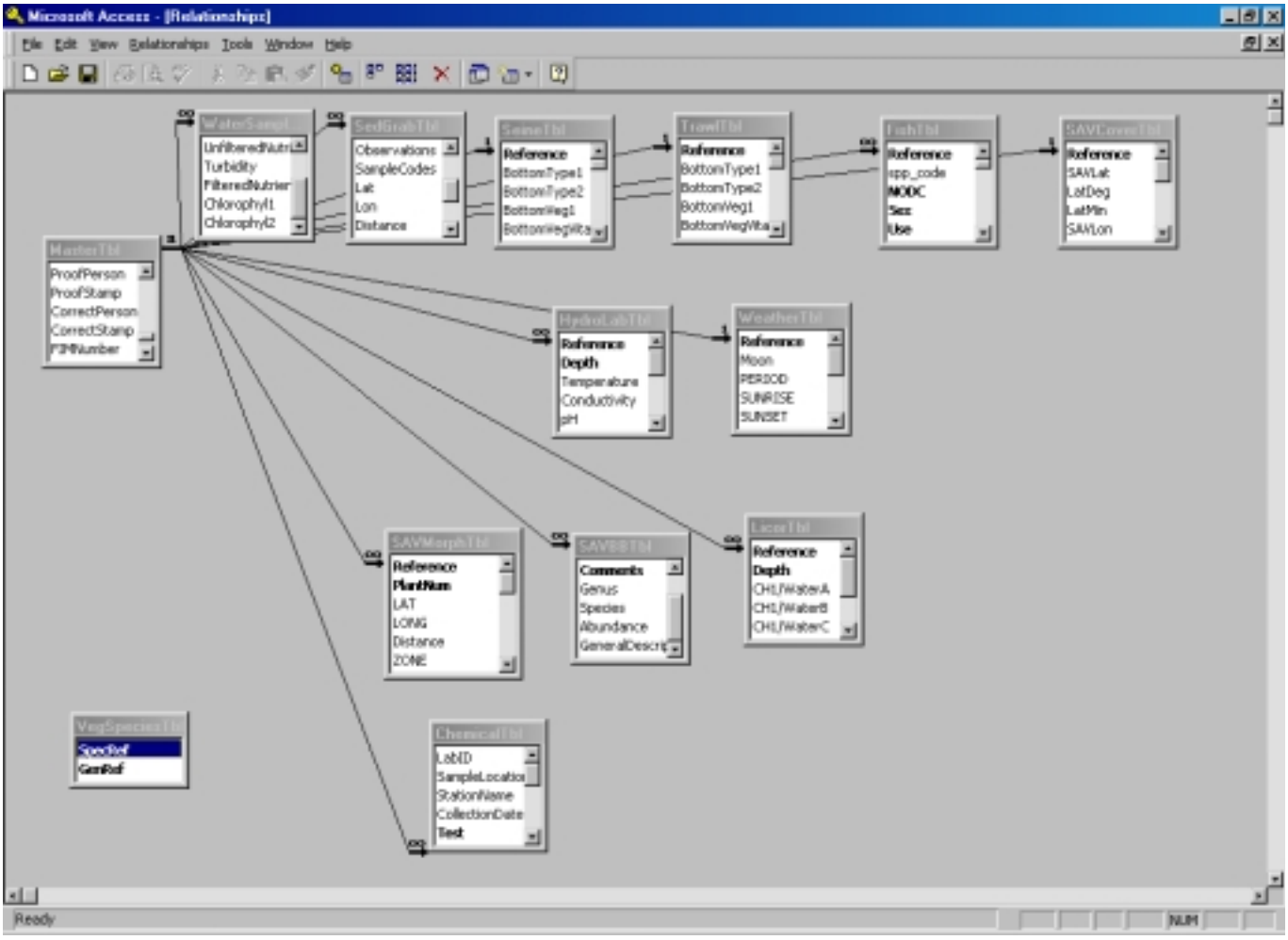

Figure 2-10: Relationships among tables in the IMAP Access Database.

Several features of the database are evident from this screenshot. The information required from every station is presented at the top of the form, while separate tabs for hydrolab, gear, water quality, sediment, SAV, fish, and chemistry data are available through individual cascading forms below. There are fields for actual vs. target latitide and longitudes, with a built-in distance calculator that computes distance from actual vs. target in nautical miles.

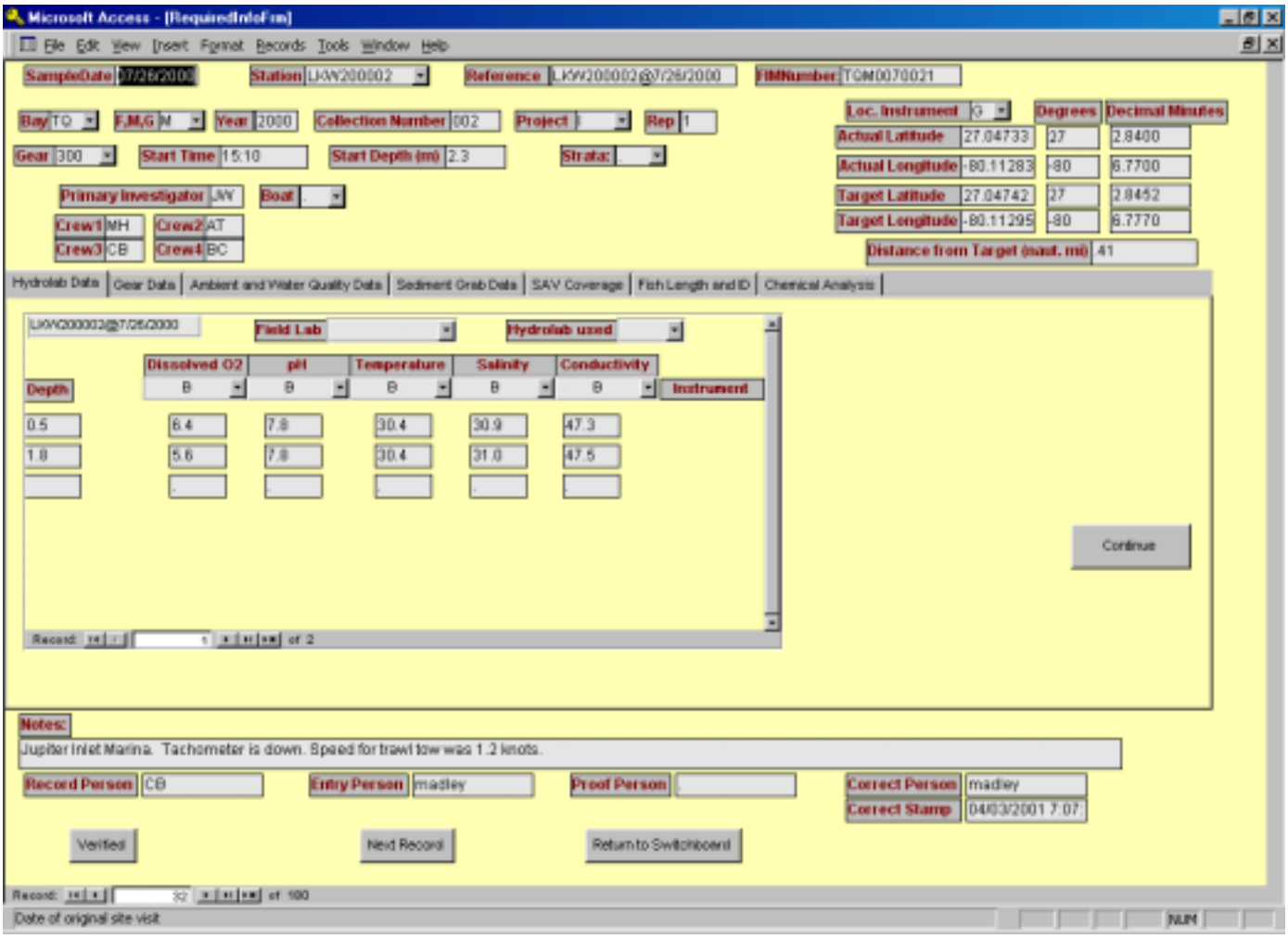

Figure 2-11: Graphical user interface for the IMAP database.

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Appendix A.

Table A-1. Water quality data from Hydrolab sampling IMAP Summer, 2000.

WATER MANAGEMENT DISTRICT SCALE STATIONS							
STATION	SAMPDEPTH	DEPTH(M)	TEMPERATURE(C)	COND	pH	SALINITY	DO
APA200001	Surface	0.5	25.80	20.40	7.20	12.10	5.20
APA200002	Surface	0.5	29.90	25.10	7.70	15.20	6.60
APA200003	Surface	0.5	29.80	28.60	7.90	17.60	6.90
APA200003	Bottom	1.2	29.70	28.60	7.90	17.80	6.90
APA200004	Surface	0.5	28.60	48.30	7.80	31.60	4.50
APA200004	Bottom	1.0	28.50	48.30	7.80	31.00	4.50
APA200005	Surface	0.5	28.40	48.00	7.90	30.80	7.00
APA200005	Bottom	2.8	28.40	48.20	7.90	30.00	7.20
APA200006	Surface	0.5	29.60	48.50	7.90	31.30	7.60
APA200006	Bottom	1.0	29.40	48.50	7.90	29.80	7.60
APA200007	Surface	0.5	28.30	47.30	7.80	31.00	6.50
APA200007	Bottom	2.5	28.30	47.40	7.80	30.80	6.60
APA200008	Surface	0.5	28.00	47.60	7.90	31.20	6.30
APA200008	Bottom	4.6	28.00	47.80	7.90	31.40	6.40
APA200009	Surface	0.5	29.20	36.40	7.70	23.00	7.00
APA200009	Bottom	1.0	28.90	37.30	7.60	23.70	6.50
APA200010	Surface	0.5	30.60	44.30	8.50	29.00	6.30
APA200010	Bottom	6.5	30.20	52.80	8.50	34.00	5.80
APA200011	Surface	0.5	30.10	47.20	8.40	30.70	5.50
APA200011	Bottom	4.2	30.10	51.50	8.40	33.90	5.80
APA200012	Surface	0.5	28.20	49.80	7.90	32.30	5.80
APA200012	Bottom	3.1	28.10	49.60	7.90	32.40	6.20
APA200013	Surface	0.5	28.70	34.40	7.70	21.80	6.10
APA200013	Bottom	1.6	29.50	42.90	7.40	27.70	4.30
APA200014	Surface	0.5	28.60	21.30	7.70	12.90	7.10
APA200014	Bottom	2.1	27.90	23.30	7.70	14.00	7.60
APA200015	Surface	0.5	28.40	49.50	7.80	32.60	5.60
APA200015	Bottom	2.9	28.20	50.10	7.80	32.80	5.50
APA200016	Surface	0.5	27.90	32.10	7.60	20.00	5.80
APA200017	Surface	0.5	30.10	37.40	8.40	23.70	5.80
APA200017	Bottom	1.3	30.00	41.80	8.30	26.90	4.90
APA200018	Surface	0.5	28.90	50.50	7.80	33.30	6.40
APA200018	Bottom	3.1	28.30	50.90	7.80	33.40	6.70
APA200019	Surface	0.5	28.20	50.50	7.90	33.10	6.10
APA200020	Surface	0.5	28.00	32.10	7.60	20.00	5.80
APA200021	Surface	0.5	31.30	42.20	8.40	27.80	6.00
APA200021	Bottom	1.9	29.90	46.80	8.40	30.50	5.20
APA200022	Surface	0.5	28.30	43.60	7.50	27.60	5.20
APA200022	Bottom	2.5	28.30	42.60	7.40	27.70	5.40
APA200023	Surface	0.5	28.90	50.50	7.90	33.30	6.40

APA200023	Bottom	1.1	28.90	50.90	7.80	33.40	6.70
APA200024	Surface	0.5	27.80	46.40	7.80	30.30	6.40
APA200024	Bottom	1.8	27.80	46.90	7.80	30.50	6.60
APA200025	Surface	0.5	28.80	36.80	7.50	22.50	6.10
APA200025	Bottom	1.8	28.50	40.60	7.50	26.00	6.50
APA200026	Surface	0.5	28.60	50.90	7.90	33.00	7.80
APA200026	Bottom	1.6	28.00	51.00	7.90	33.00	7.90
APA200027	Surface	0.5	27.70	50.90	7.80	33.50	5.80
APA200027	Bottom	2.9	27.60	50.50	7.80	33.40	6.10
APA200029	Bottom	0.1	32.50			2.50	
LKW200001	Surface	0.5	30.70	46.70	7.80	30.30	5.90
LKW200002	Surface	0.5	30.40	47.30	7.80	30.90	6.40
LKW200002	Bottom	1.8	30.40	47.50	7.80	31.00	5.60
LKW200003	Surface	0.5	29.60	27.10	7.40	16.60	4.40
LKW200004	Surface	0.4	30.10	42.30	7.70	27.20	6.30
LKW200005	Surface	0.5	30.20	43.50	7.70	28.10	6.70
LKW200006	Surface	0.5	30.70	43.00	7.60	27.70	5.20
LKW200007	Surface	0.5	30.10	43.90	7.80	28.40	6.50
LKW200007	Bottom	3.0	30.30	46.90	7.80	30.50	5.90
LKW200008	Surface	0.5	28.90	48.70	7.80	31.80	6.70
LKW200008	Bottom	1.2	28.90	48.60	7.80	31.80	6.30
LKW200009	Surface	0.5	27.40	50.50	7.80	33.10	6.70
LKW200009	Bottom	3.0	27.40	50.50	7.80	33.20	6.30
LKW200010	Surface	0.5	29.40	44.50	7.90	28.80	6.30
LKW200010	Bottom	2.1	29.50	46.70	7.90	30.30	5.90
LKW200011	Surface	0.5	29.90	42.70	7.90	27.50	5.80
LKW200011	Bottom	1.3	29.80	44.30	7.90	28.70	5.90
LKW200012	Surface	0.5	30.40	36.90	7.80	23.60	6.20
LKW200012	Bottom	3.3	29.90	46.60	7.80	30.50	5.00
LKW200013	Surface	0.5	30.30	35.20	7.80	22.10	6.30
LKW200013	Bottom	1.5	30.20	36.50	7.80	23.00	5.90
LKW200014	Surface	0.5	30.40	35.00	7.80	21.90	6.50
LKW200014	Bottom	2.0	30.30	36.20	7.80	22.80	6.50
LKW200015	Surface	0.5	29.30	27.80	7.50	15.50	6.20
LKW200015	Bottom	7.0	30.20	39.30	7.60	25.10	4.50
LKW200016	Surface	0.5	29.30	30.30	7.50	18.90	6.80
LKW200017	Surface	0.5	29.40	28.50	7.60	17.40	6.40
LKW200018	Surface	0.5	29.70	34.50	7.60	21.70	6.60
LKW200018	Bottom	2.5	30.10	44.30	7.60	28.80	3.90
LKW200019	Surface	0.5	29.70	39.70	7.70	24.90	6.40
LKW200019	Bottom	1.5	29.60	43.30	7.70	27.90	5.70
LKW200020	Surface	0.5	28.70	2.30	7.20	1.20	2.90
LKW200020	Bottom	5.0	29.30	6.70	7.20	3.70	2.10
LKW200021	Surface	0.5	29.70	45.00	7.60	29.40	6.70
LKW200021	Bottom	1.4	29.50	46.30	7.60	30.10	6.40
LKW200022	Surface	0.5	29.80	15.70	7.30	9.30	5.40
LKW200022	Bottom	1.5	29.50	31.70	7.30	19.10	4.60
LKW200023	Surface	0.5	29.50	38.30	7.50	24.60	5.20

LKW200023	Bottom	0.9	29.20	41.80	7.60	26.70	5.20
LKW200024	Surface	0.5	31.10	40.60	7.80	26.00	6.40
LKW200025	Surface	0.5	29.70	30.20	7.80	18.70	6.80
LKW200025	Bottom	3.0	32.10	39.40	7.60	25.00	2.40
LKW200026	Surface	0.5	29.60	23.50	7.80	14.20	7.80
LKW200026	Bottom	1.0	30.60	27.60	7.80	17.60	7.10
LKW200027	Surface	0.5	29.60	25.70	7.80	15.60	6.90
LKW200027	Bottom	1.7	30.50	31.70	7.70	19.90	5.70
LKW200028	Surface	0.5	27.40	2.90	7.10	1.50	2.60
LKW200028	Bottom	2.0	29.30	15.10	7.00	8.40	0.30
LKW200029	Surface	0.5	33.80	43.10	7.60	27.80	5.60
LKW200029	Bottom	1.0	33.80	43.10	7.60	27.80	5.20
LKW200030	Surface	0.5	31.00	39.90	7.80	25.40	5.80
LKW200030	Bottom	4.5	31.10	39.90	7.70	25.50	5.30
NSJ200001	Surface	0.5	29.20	57.00	7.90	38.00	6.20
NSJ200001	Bottom	6.5	28.60	57.80	7.90	38.60	6.30
NSJ200002	Surface	0.5	32.70	55.20	7.30	36.70	4.40
NSJ200003	Surface	0.5	30.10	56.50	7.30	37.60	5.60
NSJ200003	Bottom	1.0	30.10	56.70	7.30	37.80	5.60
NSJ200004	Surface	0.5	29.90	56.40	7.50	37.50	6.10
NSJ200005	Surface	0.5	27.80	56.90	7.70	37.90	6.40
NSJ200005	Bottom	2.0	27.80	57.30	7.70	38.30	6.30
NSJ200006	Surface	0.5	26.60	56.70	7.80	37.80	7.20
NSJ200006	Bottom	1.5	26.50	57.30	7.80	38.20	7.30
NSJ200007	Surface	0.5	26.10	56.60	7.90	37.80	11.20
NSJ200007	Bottom	3.0	26.00	56.70	7.90	37.80	7.50
NSJ200008	Surface	0.5	29.70	53.30	7.90	35.20	6.30
NSJ200008	Bottom	1.3	29.60	54.00	7.90	25.80	6.20
NSJ200009	Surface	0.5	29.80	43.60	7.90	28.10	6.30
NSJ200009	Bottom	9.5	29.50	46.80	7.90	30.50	5.70
NSJ200010	Surface	0.5	29.80	53.80	7.90	35.60	6.20
NSJ200010	Bottom	2.5	29.80	54.50	7.90	36.20	6.70
NSJ200011	Surface	0.5	29.50	53.30	7.90	35.30	5.80
NSJ200011	Bottom	1.5	29.40	53.90	7.90	35.70	5.90
NSJ200012	Surface	0.5	29.70	53.20	7.90	35.20	5.70
NSJ200012	Bottom	5.5	29.60	53.50	7.90	25.40	5.80
NSJ200013	Surface	0.5	28.90	54.30	7.90	35.90	5.50
NSJ200014	Surface	0.5	29.60	48.50	7.90	31.80	6.20
NSJ200015	Surface	0.5	30.10	29.80	7.90	18.40	7.80
NSJ200015	Bottom	2.0	29.80	30.00	7.80	18.60	7.00
NSJ200016	Surface	0.5	30.10	51.50	7.20	33.90	4.30
NSJ200017	Surface	0.5	29.80	29.20	7.90	18.10	7.10
NSJ200017	Bottom	2.3	29.40	30.20	7.70	18.60	6.40
NSJ200018	Surface	0.5	30.20	24.40	7.40	14.80	5.40
NSJ200019	Surface	0.5	29.60	28.70	7.90	17.60	7.30
NSJ200019	Bottom	4.5	29.50	30.10	7.70	18.70	6.10
NSJ200020	Surface	0.5	30.00	22.50	7.90	13.50	7.90
NSJ200020	Bottom	1.6	30.00	22.70	7.90	13.60	7.50

NSJ200021	Surface	0.5	30.00	24.30	7.80	14.70	6.40
NSJ200021	Bottom	5.5	29.60	26.30	7.50	16.10	5.10
NSJ200022	Surface	0.5	29.80	21.40	7.50	12.80	5.60
NSJ200022	Bottom	2.6	29.70	21.50	7.50	12.90	5.00
NSJ200023	Surface	0.5	29.80	20.60	7.50	12.30	5.70
NSJ200023	Bottom	2.6	29.70	20.70	7.50	12.40	5.60
NSJ200024	Surface	0.5	30.10	18.20	7.70	11.10	6.60
NSJ200024	Bottom	6.6	29.70	19.20	7.50	11.40	5.50
NSJ200025	Surface	0.5	29.70	15.10	7.60	8.70	7.90
NSJ200025	Bottom	1.7	29.20	15.40	7.50	9.30	7.50
NSJ200026	Surface	0.5	30.10	15.50	8.10	9.00	9.70
NSJ200026	Bottom	1.9	29.20	15.80	7.60	9.20	7.10
NSJ200027	Surface	0.5	30.20	12.60	7.50	7.30	8.00
NSJ200027	Bottom	5.0	29.20	15.30	7.20	8.90	6.30
NSJ200028	Surface	0.5	31.20	11.50	7.60	6.30	7.80
NSJ200028	Bottom	3.5	30.00	14.10	7.40	8.20	6.50
NSJ200029	Surface	0.5	31.90	11.30	7.80	6.40	8.50
NSJ200029	Bottom	2.0	29.40	13.30	7.20	7.70	6.40
NSJ200030	Surface	0.5	32.20	10.00	8.00	5.70	8.40
NSJ200030	Bottom	2.0	30.10	13.80	7.30	8.00	6.10
SUW200001	Surface	0.5	28.80	0.30	7.70	0.00	5.20
SUW200001	Bottom	2.2	28.10	0.30	7.70	0.00	5.20
SUW200002	Surface	0.5	28.90	33.60	7.90	21.00	6.50
SUW200002	Bottom	1.1	28.90	33.60	7.90	21.00	6.40
SUW200003	Surface	0.5	28.90	33.40	8.20	20.90	5.50
SUW200003	Bottom	1.1	28.90	33.40	8.20	20.90	5.50
SUW200004	Surface	0.5	29.40	0.30	7.70	0.00	4.90
SUW200004	Bottom	5.5	28.50	0.30	7.70	0.00	4.80
SUW200005	Surface	0.5	28.20	31.50	7.40	19.50	3.90
SUW200005	Bottom	1.0	28.10	31.50	7.30	19.50	4.00
SUW200006	Surface	0.5	29.50	33.10	7.80	20.70	5.50
SUW200006	Bottom	1.7	29.50	33.10	7.80	20.70	5.60
SUW200007	Surface	0.5	29.10	23.70	7.70	14.30	4.80
SUW200007	Bottom	1.0	29.40	29.50	7.80	18.20	5.10
SUW200008	Surface	0.5	29.80	28.70	7.90	17.70	6.60
SUW200008	Bottom	1.2	29.80	28.70	7.90	17.60	6.70
SUW200009	Surface	0.5	29.40	28.30	7.90	17.40	6.30
SUW200009	Bottom	2.1	29.60	39.40	7.80	25.10	3.60
SUW200010	Surface	0.5	29.90	41.20	8.00	26.40	5.90
SUW200010	Bottom	1.0	29.80	41.00	7.90	26.30	6.00
SUW200011	Surface	0.5	29.30	27.10	7.90	16.60	5.70
SUW200011	Bottom	1.3	29.50	37.80	7.80	24.00	4.10
SUW200012	Surface	0.5	29.10	32.00	7.80	19.90	5.20
SUW200012	Bottom	1.6	29.90	44.70	7.80	28.90	3.00
SUW200013	Surface	0.5	30.80	42.00	7.90	27.00	6.30
SUW200013	Bottom	1.8	30.60	42.90	7.90	27.60	5.80
SUW200014	Surface	0.5	28.80	37.60	7.60	23.90	4.80
SUW200014	Bottom	1.7	29.70	45.90	7.60	29.80	3.50

SUW200015	Surface	0.5	30.30	49.70	8.00	32.40	6.80
SUW200015	Bottom	2.2	30.30	49.70	8.00	32.40	6.50
SUW200016	Surface	0.5	30.60	46.10	8.00	30.00	6.00
SUW200016	Bottom	1.5	30.50	46.30	8.00	30.00	5.80
SUW200017	Surface	0.5	31.00	49.30	8.20	32.20	6.40
SUW200017	Bottom	1.8	31.00	49.20	8.20	32.30	5.90
SUW200018	Surface	0.5	30.60	47.30	7.90	30.60	4.80
SUW200019	Surface	0.5	29.60	44.30	7.90	28.70	6.70
SUW200020	Surface	0.5	31.00	44.50	8.40	28.80	12.20
SUW200021	Surface	0.5	29.30	45.50	8.00	29.40	7.00
SUW200021	Bottom	1.0	29.30	45.40	7.90	29.50	7.00
SUW200022	Surface	0.5	28.40	48.80	7.90	31.90	7.30
SUW200022	Bottom	2.1	28.30	48.90	7.80	32.00	7.20
SUW200023	Surface	0.5	30.00	43.60	8.20	28.10	8.70
SUW200023	Bottom	1.0	29.10	44.00	8.00	28.40	6.10
SUW200024	Surface	0.5	31.30	48.90	8.00	31.70	7.10
SUW200025	Surface	0.5	28.80	46.10	7.90	29.90	6.60
SUW200025	Bottom	1.0	28.80	46.30	7.80	30.10	6.10
SUW200026	Surface	0.5	32.00	47.00	7.80	30.40	7.50
SUW200026	Bottom	2.0	31.50	47.40	7.70	30.60	7.70
SUW200027	Surface	0.5	35.10	49.40	8.60	31.20	11.50
SUW200028	Surface	0.5	30.30	0.30	7.60	0.00	4.80
SUW200028	Bottom	3.0	28.90	0.30	7.60	0.00	4.50
SUW200029	Surface	0.5	29.10			5.80	
SUW200029	Bottom	1.3	28.80			6.40	
SUW200030	Surface	0.5	28.20	20.10	7.20	11.90	3.20
SUW200030	Bottom	1.1	28.30	20.50	7.20	12.30	3.10
TAM200001	Surface	0.5	30.20	46.40	8.10	30.20	5.70
TAM200001	Bottom	1.0	30.20	46.40	8.10	30.20	5.70
TAM200002	Surface	0.5	30.90	47.70	8.10	31.10	7.70
TAM200002	Bottom	2.0	30.80	47.70	8.10	31.10	7.10
TAM200003	Surface	0.5	29.90	45.70	8.10	29.70	6.50
TAM200003	Bottom	3.7	29.80	45.90	8.00	29.80	5.80
TAM200004	Surface	0.5	30.70	46.90	8.00	30.50	5.40
TAM200004	Bottom	4.0	30.70	47.00	8.00	30.60	5.00
TAM200005	Surface	0.5	31.10	48.10	8.10	31.40	7.30
TAM200005	Bottom	1.7	31.10	48.10	8.10	31.40	7.20
TAM200006	Surface	0.5	31.20	48.70	7.90	31.80	6.20
TAM200006	Bottom	4.8	31.10	48.80	7.90	31.90	5.90
TAM200007	Surface	0.5	30.80	48.70	8.00	31.90	6.00
TAM200007	Bottom	4.7	30.80	48.90	8.00	32.00	5.30
TAM200008	Surface	0.5	29.60	44.40	8.40	28.70	6.70
TAM200008	Bottom	1.6	30.00	46.80	8.10	30.40	4.50
TAM200009	Surface	0.5	30.50	52.40	8.00		5.20
TAM200009	Bottom	1.8	30.30	52.00	8.00	34.40	4.80
TAM200010	Surface	0.5	30.90	49.60	8.00	32.50	6.00
TAM200010	Bottom	4.8	30.40	49.70	7.90	32.60	5.30
TAM200011	Surface	0.5	31.50	48.40	8.20	31.20	7.80

TAM200012	Surface	0.5	30.60	49.60	8.00	32.50	6.00
TAM200012	Bottom	3.3	30.30	49.60	8.00	32.50	6.10
TAM200013	Surface	0.5	30.10	46.80	8.20	30.50	8.40
TAM200013	Bottom	3.0	29.70	47.40	8.10	30.90	7.20
TAM200014	Surface	0.5	30.20	49.70	8.00	32.60	5.60
TAM200014	Bottom	4.6	30.10	49.80	8.10	32.70	5.40
TAM200015	Surface	0.5	28.60	37.30	7.90	23.70	3.80
TAM200016	Surface	0.5	30.90	52.80	8.10	34.90	5.80
TAM200016	Bottom	3.5	30.30	53.90	8.10	35.70	5.30
TAM200017	Surface	0.5	29.80	47.20	8.30	30.70	4.80
TAM200017	Bottom	1.4	29.40	47.20	8.30	31.10	5.10
TAM200018	Surface	0.5	29.50	40.70	8.00	26.00	5.90
TAM200018	Bottom	5.8	29.70	40.70	8.00	26.10	6.60
TAM200019	Surface	0.5	29.10	49.10	8.40	32.10	4.60
TAM200019	Bottom	3.1	29.10	49.10	8.30	32.10	5.00
TAM200020	Surface	0.5	28.70	51.40	8.20	33.80	5.50
TAM200020	Bottom	1.5	28.60	51.40	8.20	33.80	6.00
TAM200021	Surface	0.5	30.40	49.50	8.20	32.40	6.70
TAM200021	Bottom	1.6	30.30	49.50	8.20	32.50	6.90
TAM200022	Surface	0.5	31.00	51.40	8.60	33.90	7.70
TAM200023	Surface	0.5	29.70	49.50	8.10	32.40	6.10
TAM200023	Bottom	6.6	29.80	50.10	8.10	32.90	5.90
TAM200024	Surface	0.5	29.20	50.30	8.10	33.00	6.30
TAM200024	Bottom	6.4	29.60	51.90	8.10	34.20	5.90
TAM200025	Surface	0.5	30.80	43.50	8.10	28.10	6.50
TAM200025	Bottom	10.0	30.50	43.90	8.20	28.40	7.00
TAM200026	Surface	0.5	30.50	49.20	8.20	32.20	6.80
TAM200027	Surface	0.5	31.00	50.50	8.10	33.20	6.00
TAM200027	Bottom	2.3	31.00	50.60	8.10	33.20	5.90
TAM200028	Surface	.5	31.2	0.53	8.71	0.00	12.48
TAM200028	Bottom	2.7	29.2	0.52	7.55	0.00	5.87
TAM200029	Surface	0.5	30.20	45.10	8.40	28.50	5.20
TAM200030	Surface	.9	29.6	0.25	6.73	0.00	1.24
STATE SCALE STATIONS							
STATION	SAMPDEPTH	DEPTH(M)	TEMPERATURE(C)	COND	pH	SALINITY	DO
STR200001	Surface	0.25	9.30	26.60	8.00	16.20	4.80
STR200002	Surface	0.50	30.80	44.40	8.50	28.80	6.00
STR200002	Bottom	5.10	30.50	50.00	8.30	32.80	3.20
STR200003	Surface	0.50	27.20	44.40	8.00	29.10	7.20
STR200003	Bottom	1.50	27.20	44.80	8.00	29.40	7.90
STR200004	Surface	0.50	29.70	0.10	8.00	0.00	5.60
STR200006	Surface	0.50	29.90	24.70	7.70	15.00	8.60
STR200006	Bottom	4.00	29.70	26.60	7.50	16.20	5.00
STR200008	Surface	0.50	29.60	21.20	7.70	12.70	5.60
STR200008	Bottom	1.50	29.50	22.00	7.60	13.20	4.60
STR200009	Surface	0.50	29.60	47.10	8.30	31.10	6.00
STR200009	Bottom	3.90	29.70	48.00	8.40	31.70	6.60

STR200010	Surface	0.50	30.20	41.10	8.50	27.40	6.50
STR200010	Bottom	4.90	30.20	52.00	8.50	34.80	6.60
STR200011	Surface	0.50	30.10	42.60	8.20	27.40	9.90
STR200011	Bottom	1.00	29.70	42.90	8.20	27.60	9.60
STR200012	Surface	0.50	29.10	61.60	8.00	41.50	4.80
STR200012	Bottom	1.10	29.10	62.30	8.00	42.00	4.70
STR200014	Surface	0.50	30.20	45.40	8.10	29.50	6.50
STR200014	Bottom	3.40	30.10	45.50	8.10	29.90	6.30
STR200015	Surface	0.50	28.60	56.70	7.90	37.80	6.20
STR200015	Bottom	1.00	28.60	57.20	7.90	38.20	6.10
STR200016	Surface	0.50	29.40	42.40	8.20	27.30	8.90
STR200018	Surface	0.50	30.30	43.80	8.10	28.30	6.50
STR200018	Bottom	5.70	30.30	43.70	8.10	28.30	6.50
STR200019	Surface	0.50	30.90	51.30	8.20	33.80	5.80
STR200020	Surface	0.50	29.10	50.10	8.00	33.00	5.80
STR200020	Bottom	4.40	29.20	51.30	7.90	33.80	5.00
STR200021	Surface	0.50	29.10	56.50	8.10	37.60	6.20
STR200021	Bottom	2.50	29.00	56.40	8.10	37.60	6.20
STR200022	Surface	0.50	28.30	46.60	8.00	30.40	6.00
STR200022	Bottom	1.60	28.30	48.70	7.90	31.90	5.70
STR200023	Surface	0.50	29.20	58.50	8.10	39.10	7.20
STR200025	Surface	0.50	28.40	56.30	7.90	37.50	5.60
STR200025	Bottom	2.80	28.40	56.20	7.90	37.50	5.60
STR200026	Surface	0.50	29.80	54.20	8.00	35.90	6.80
STR200026	Bottom	1.80	29.80	54.20	8.00	35.80	6.80
STR200027	Surface	0.50	29.10	56.10	8.10	37.40	6.00
STR200027	Bottom	4.00	29.10	56.10	8.10	37.30	6.10
STR200028	Surface	0.50	28.90	56.60	8.00	37.70	5.90
STR200028	Bottom	2.70	28.90	56.70	8.00	37.70	6.10
STR200029	Surface	0.50	29.90	54.30	8.00	36.10	6.40
STR200029	Bottom	2.00	29.90	54.40	8.00	36.10	6.50
STR200030	Surface	0.50	27.80	53.90	7.70	35.60	4.80
STR200030	Bottom	1.40	27.80	53.80	7.70	35.70	4.70
STT200005	Surface	0.50	28.80	53.40	7.60	35.30	4.10
STT200007	Surface	0.50	29.60	52.00	8.40	34.10	5.90
STT200007	Bottom	3.50	29.70	51.70	8.40	34.60	6.20
STT200013	Surface	0.50	29.60	40.70	8.50	26.00	6.20
STT200013	Bottom	1.60	29.40	41.20	8.40	26.40	6.10
STT200017	Surface	0.50	31.70	51.30	8.20	33.80	8.10
STT200024	Surface	0.50	28.90	49.60	7.90	32.60	5.90
STT200024	Bottom	1.60	28.90	49.70	7.90	32.50	5.80

Table A-2. Total Organic Carbon in Sediment Samples (incomplete, mg/kg DW) IMAP sampling Summer, 2000.

Results Codes: J= Estimated Value Q= Sample held beyond normal holding time.

WATER MANAGEMENT DISTRICT SCALE STATIONS			
STATION	PARAMETER	VALUE	CODE
APA200001	TOC	8000	
APA200004	TOC	2000	
APA200005	TOC	3300	
APA200006	TOC	11000	
APA200007	TOC	1700	
APA200007	TOC	8900	
APA200008	TOC	2700	
APA200009	TOC	20000	
APA200012	TOC	3700	
APA200013	TOC	11000	
APA200014	TOC	7800	
APA200015	TOC	20000	
APA200016	TOC	34000	
APA200017	TOC	21000	
APA200018	TOC	28000	
APA200019	TOC	1600	
APA200020	TOC	31000	
APA200021	TOC	24000	
APA200022	TOC	8100	
APA200023	TOC	2200	
APA200024	TOC	7700	
APA200025	TOC	21000	
APA200026	TOC	2100	
APA200027	TOC	32000	
LKW200001	TOC	2400	J
LKW200002	TOC	8100	J
LKW200003	TOC	5300	J
LKW200004	TOC	3100	J
LKW200005	TOC	7700	J
LKW200006	TOC	2000	J
LKW200007	TOC	24000	J
LKW200008	TOC	2800	J
LKW200009	TOC	2500	J
LKW200010	TOC	1700	J
LKW200011	TOC	1800	J
LKW200012	TOC	28000	J
LKW200013	TOC	7800	J
LKW200014	TOC	10000	J
LKW200015	TOC	110000	J

LKW200016	TOC	6700	J
LKW200017	TOC	3500	J
LKW200018	TOC	120000	J
LKW200019	TOC	4800	J
LKW200020	TOC	29000	J
LKW200021	TOC	64000	J
LKW200022	TOC	3300	J
LKW200023	TOC	4000	J
LKW200024	TOC	17000	J
LKW200025	TOC	52000	J
LKW200026	TOC	2700	J
LKW200027	TOC	71000	J
LKW200028	TOC	38000	J
LKW200029	TOC	2300	J
LKW200030	TOC	9200	J
NSJ200001	TOC	4700	J
NSJ200002	TOC	5400	J
NSJ200003	TOC	3300	J
NSJ200004	TOC	2500	
NSJ200005	TOC	1800	
NSJ200006	TOC	860	
NSJ200007	TOC	1300	
NSJ200008	TOC	4200	J
NSJ200010	TOC	15000	J
NSJ200011	TOC	3000	J
NSJ200012	TOC	2800	J
NSJ200013	TOC	2200	J
NSJ200014	TOC	74000	J
NSJ200015	TOC	80000	Q
NSJ200016	TOC	30000	Q
NSJ200017	TOC	95000	Q
NSJ200018	TOC	90000	Q
NSJ200019	TOC	48000	Q
NSJ200020	TOC	100000	Q
NSJ200021	TOC	43000	Q
NSJ200022	TOC	130000	Q
NSJ200023	TOC	110000	Q
NSJ200024	TOC	74000	Q
NSJ200025	TOC	170000	
NSJ200026	TOC	140000	
NSJ200027	TOC	76000	
NSJ200028	TOC	22000	
NSJ200029	TOC	29000	
NSJ200030	TOC	180000	
SUW200015	TOC	2000	
SUW200018	TOC	2200	
SUW200024	TOC	7800	
SUW200026	TOC	5400	
SUW200027	TOC	13000	

TAM200001	TOC	2300	Q
TAM200002	TOC	5000	Q
TAM200003	TOC	5100	
TAM200004	TOC	8900	Q
TAM200005	TOC	2300	Q
TAM200006	TOC	1800	Q
TAM200007	TOC	2800	Q
TAM200008	TOC	2900	
TAM200009	TOC	7200	J
TAM200010	TOC	1800	J
TAM200011	TOC	2300	
TAM200012	TOC	2000	J
TAM200013	TOC	3200	
TAM200014	TOC	2000	J
TAM200016	TOC	48000	J
TAM200017	TOC	1700	Q
TAM200018	TOC	2400	Q
TAM200019	TOC	1600	Q
TAM200020	TOC	1400	Q
TAM200021	TOC	2000	
TAM200022	TOC	11000	
TAM200023	TOC	2700	
TAM200024	TOC	1700	
TAM200025	TOC	2700	
TAM200026	TOC	1900	
TAM200027	TOC	1900	
TAM200029	TOC	4400	
STATEWIDE SCALE STATIONS			
STATION	PARAMETER	VALUE	CODE
STR200001	TOC	3600	
STR200002	TOC	40000	
STR200003	TOC	6300	
STR200006	TOC	28000	J
STR200008	TOC	54000	J
STR200009	TOC	5000	
STR200010	TOC	2500	
STR200012	TOC	13000	
STR200014	TOC	2500	
STR200015	TOC	6000	
STR200016	TOC	1800	
STR200018	TOC	2500	
STR200019	TOC	5200	
STR200020	TOC	8300	
STR200021	TOC	9000	
STR200022	TOC	9100	
STR200023	TOC	39000	
STR200025	TOC	5900	
STR200027	TOC	20000	

STR200028	TOC	15000	
STR200029	TOC	14000	
STR200030	TOC	23000	
STT200005	TOC	61000	J
STT200007	TOC	1900	
STT200013	TOC	15000	
STT200017	TOC	10000	J
STT200024	TOC	12000	

Table A-3. Sediment chemistry analytes, IMAP sampling Summer, 2000.

Metals	**Semi-volatile Organic Pollutants**
Mercury	1,2,4-Trichlorobenzene
Aluminum	1,2-Dichlorobenzene
Antimony	1,3-Dichlorobenzene
Arsenic	1,4-Dichlorobenzene
Cadmium	2,4,6-Trichlorophenol
Chromium	2,4-Dichlorophenol
Copper	2,4-Dimethylphenol
Iron	2,4-Dinitrophenol
Lead	2,4-Dinitrotoluene
Manganese	2,6-Dinitrotoluene
Nickel	2-Chloronaphthalene
Selenium	2-Chlorophenol
Silver	2-Methyl-4,6-dinitrophenol
Tin	2-Nitrophenol
Zinc	3,3'-Dichlorobenzidine
	4,4'-DDD
Carbamates	4,4'-DDE
3-Hydroxycarbofuran	4,4'-DDT
Aldicarb	4-Bromophenyl phenyl ether
Aldicarb Sulfone	4-Chloro-3-methylphenol
Aldicarb Sulfoxide	4-Chlorophenyl phenyl ether
Carbaryl	4-Nitrophenol
Carbofuran	Acenaphthene
Diuron	Acenaphthylene
Linuron	Aldrin
Methiocarb	alpha-BHC
Methomyl	Anthracene
Oxamyl	Azobenzene/1,2-Diphenylhydrazine
Propoxur	Benzidine
	Benzo(a)anthracene
Organochlorine Pesticides	Benzo(a)pyrene
Alachlor	Benzo(b)fluoranthene
Aldrin	Benzo(g,h,i)perylene
Alpha-BHC	Benzo(k)fluoranthene
Ametryn	beta-BHC
Atrazine	Bis(2-chloroethoxy)methane
Azinphos Methyl	Bis(2-chloroethyl)ether
Beta-BHC	Bis(2-chloroisopropyl)ether
Bromacil	Bis(2-ethylhexyl)phthalate
Chlordane	Butyl benzyl phthalate
Chlorothalonil	Chrysene
Chlorpyrifos Ethyl	delta-BHC
Chlorpyrifos Methyl	Dibenzo(a,h)anthracene
DDD-p,p'	Dieldrin
DDE-p,p'	Diethyl phthalate

DDT-p,p'	Dimethyl phthalate
Organochlorine Pesticides (con.)	**Semi-volatile Organic Pollutants (con.)**
Delta-BHC	Di-n-butyl phthalate
Diazinon	Di-n-octyl phthalate
Dieldrin	Endosulfan I
Endosulfan I	Endosulfan II
Endosulfan II	Endosulfan sulfate
Endosulfan Sulfate	Endrin
Endrin	Endrin aldehyde
Endrin Aldehyde	Fluoranthene
Ethion	Fluorene
Ethoprop	gamma-BHC
Fenamiphos	Heptachlor
Fenarimol	Heptachlor epoxide
Fonofos	Hexachlorobenzene
Gamma-BHC	Hexachlorobutadiene
Heptachlor	Hexachlorocyclopentadiene
Heptachlor Epoxide	Hexachloroethane
Hexazinone	Indeno(1,2,3-cd)pyrene
Iprodione	Isophorone
Malathion	Naphthalene
Metalaxyl	Nitrobenzene
Methamidophos	N-Nitrosodimethylamine
Methoxychlor	N-Nitrosodi-n-propylamine
Metolachlor	N-Nitrosodiphenylamine
Metribuzin	Pentachlorophenol
Mevinphos	Phenanthrene
Monocrotophos	Phenol
Naled	Pyrene
Norflurazon	
Parathion Ethyl	
Parathion Methyl	
PCNB	
Phorate	
Prometryn	
Simazine	
Toxaphene	

Table A-4. Metals in sediment, IMAP Sampling summer 2000.

Results codes: U=Not detected; I=Detected but below laboratory minimum quantitation level; A=mean of two or more observations; J=estimated value; Q=sample exceeded recommended hold time.

STATION	PARAMETER	VALUE (mg/kg)	CODE
STR200001	Aluminum	2440.0	
STR200001	Antimony	2.1	U
STR200001	Arsenic	3.0	U
STR200001	Cadmium	0.1	U
STR200001	Chromium	9.0	I
STR200001	Copper	2.5	U
STR200001	Iron	2390.0	
STR200001	Lead	4.8	I
STR200001	Manganese	38.7	
STR200001	Nickel	1.3	I
STR200001	Selenium	2.5	U
STR200001	Silver	3.6	U
STR200001	Tin	1.2	U
STR200001	Zinc	60.0	U
STR200002	Aluminum	68800.0	
STR200002	Antimony	1.9	U
STR200002	Arsenic	15.3	J
STR200002	Cadmium	0.2	U
STR200002	Chromium	80.6	
STR200002	Copper	12.8	
STR200002	Iron	51600.0	
STR200002	Lead	35.1	
STR200002	Manganese	436.0	
STR200002	Nickel	22.4	
STR200002	Selenium	2.8	U
STR200002	Silver	5.0	U
STR200002	Tin	1.3	U
STR200002	Zinc	100.0	I
STR200003	Aluminum	1070.0	A
STR200003	Antimony	0.7	U
STR200003	Arsenic	1.0	U
STR200003	Cadmium	0.1	U
STR200003	Chromium	4.5	I
STR200003	Copper	2.5	U
STR200003	Iron	952.0	AJ
STR200003	Lead	2.5	U
STR200003	Manganese	19.5	AJ
STR200003	Nickel	1.2	U
STR200003	Selenium	2.5	U
STR200003	Silver	0.3	U
STR200003	Tin	1.2	U
STR200003	Zinc	60.0	U
STR200006	Aluminum	30600.0	

STR200006	Antimony	0.8	U
STR200006	Arsenic	4.8	U
STR200006	Cadmium	0.1	I
STR200006	Chromium	24.0	
STR200006	Copper	7.7	I
STR200006	Iron	10500.0	
STR200006	Lead	27.0	
STR200006	Manganese	190.0	
STR200006	Nickel	5.9	
STR200006	Selenium	2.7	U
STR200006	Silver	3.8	U
STR200006	Tin	1.3	U
STR200006	Zinc	65.0	U
STR200008	Aluminum	43400.0	
STR200008	Antimony	0.7	U
STR200008	Arsenic	1.3	I
STR200008	Cadmium	0.7	
STR200008	Chromium	66.0	
STR200008	Copper	23.3	
STR200008	Iron	30400.0	
STR200008	Lead	55.9	
STR200008	Manganese	274.0	
STR200008	Nickel	17.3	
STR200008	Selenium	2.6	U
STR200008	Silver	2.8	U
STR200008	Tin	1.2	U
STR200008	Zinc	130.0	I
STR200009	Aluminum	2420.0	
STR200009	Antimony	0.7	U
STR200009	Arsenic	1.0	U
STR200009	Cadmium	0.1	U
STR200009	Chromium	3.9	I
STR200009	Copper	2.5	U
STR200009	Iron	1270.0	
STR200009	Lead	2.6	I
STR200009	Manganese	14.7	
STR200009	Nickel	1.2	U
STR200009	Selenium	2.5	U
STR200009	Silver	0.8	U
STR200009	Tin	6.6	U
STR200009	Zinc	60.0	U
STR200010	Aluminum	1900.0	
STR200010	Antimony	0.7	U
STR200010	Arsenic	1.0	I
STR200010	Cadmium	0.0	U
STR200010	Chromium	2.9	U
STR200010	Copper	2.4	U
STR200010	Iron	1580.0	
STR200010	Lead	2.4	U

STR200010	Manganese	25.7	
STR200010	Nickel	1.2	I
STR200010	Selenium	2.4	U
STR200010	Silver	0.3	U
STR200010	Tin	2.8	U
STR200010	Zinc	59.0	U
STR200011	Aluminum	1690.0	
STR200011	Antimony	0.7	U
STR200011	Arsenic	1.0	U
STR200011	Cadmium	0.1	U
STR200011	Chromium	4.5	I
STR200011	Copper	2.5	U
STR200011	Iron	1390.0	
STR200011	Lead	3.3	I
STR200011	Manganese	8.3	
STR200011	Nickel	1.2	U
STR200011	Selenium	2.5	U
STR200011	Silver	0.3	U
STR200011	Tin	3.4	U
STR200011	Zinc	61.0	U
STR200012	Aluminum	15400.0	
STR200012	Antimony	0.8	I
STR200012	Arsenic	1.1	U
STR200012	Cadmium	0.1	I
STR200012	Chromium	8.6	I
STR200012	Copper	2.7	U
STR200012	Iron	3960.0	
STR200012	Lead	9.1	I
STR200012	Manganese	66.1	
STR200012	Nickel	2.4	I
STR200012	Selenium	2.7	U
STR200012	Silver	0.3	U
STR200012	Tin	1.3	U
STR200012	Zinc	65.0	U
STR200014	Aluminum	2930.0	
STR200014	Antimony	0.7	U
STR200014	Arsenic	1.0	U
STR200014	Cadmium	0.1	U
STR200014	Chromium	9.7	I
STR200014	Copper	2.5	U
STR200014	Iron	1520.0	
STR200014	Lead	7.0	I
STR200014	Manganese	17.1	
STR200014	Nickel	2.5	I
STR200014	Selenium	2.5	U
STR200014	Silver	1.0	I
STR200014	Tin	1.2	U
STR200014	Zinc	59.0	U
STR200015	Aluminum	17900.0	

STR200015	Antimony	0.7	U
STR200015	Arsenic	2.5	I
STR200015	Cadmium	0.2	I
STR200015	Chromium	15.8	
STR200015	Copper	2.6	U
STR200015	Iron	7120.0	
STR200015	Lead	8.9	I
STR200015	Manganese	156.0	
STR200015	Nickel	3.3	I
STR200015	Selenium	2.6	U
STR200015	Silver	0.3	U
STR200015	Tin	1.3	U
STR200015	Zinc	64.0	U
STR200016	Aluminum	1120.0	A
STR200016	Antimony	0.7	U
STR200016	Arsenic	1.0	U
STR200016	Cadmium	0.1	U
STR200016	Chromium	5.3	I
STR200016	Copper	2.5	U
STR200016	Iron	594.0	A
STR200016	Lead	2.5	U
STR200016	Manganese	6.6	A
STR200016	Nickel	1.2	U
STR200016	Selenium	2.5	U
STR200016	Silver	0.9	U
STR200016	Tin	1.2	U
STR200016	Zinc	60.0	U
STR200018	Aluminum	1360.0	
STR200018	Antimony	2.8	I
STR200018	Arsenic	1.7	I
STR200018	Cadmium	0.2	I
STR200018	Chromium	3.2	I
STR200018	Copper	2.5	U
STR200018	Iron	2630.0	
STR200018	Lead	4.1	I
STR200018	Manganese	51.1	
STR200018	Nickel	1.9	I
STR200018	Selenium	2.9	I
STR200018	Silver	0.3	I
STR200018	Tin	2.8	U
STR200018	Zinc	60.0	U
STR200019	Aluminum	2420.0	
STR200019	Antimony	0.7	U
STR200019	Arsenic	1.0	U
STR200019	Cadmium	0.1	U
STR200019	Chromium	6.2	I
STR200019	Copper	2.5	U
STR200019	Iron	1050.0	
STR200019	Lead	3.3	I

STR200019	Manganese	8.2	
STR200019	Nickel	1.5	I
STR200019	Selenium	2.5	U
STR200019	Silver	0.9	U
STR200019	Tin	3.6	U
STR200019	Zinc	61.0	U
STR200020	Aluminum	2850.0	
STR200020	Antimony	0.7	U
STR200020	Arsenic	1.0	U
STR200020	Cadmium	0.1	U
STR200020	Chromium	7.7	I
STR200020	Copper	2.6	U
STR200020	Iron	1820.0	
STR200020	Lead	3.3	I
STR200020	Manganese	9.2	
STR200020	Nickel	2.0	I
STR200020	Selenium	2.6	U
STR200020	Silver	0.3	U
STR200020	Tin	3.7	U
STR200020	Zinc	62.0	U
STR200021	Aluminum	615.0	A
STR200021	Antimony	2.0	I
STR200021	Arsenic	1.2	I
STR200021	Cadmium	0.1	I
STR200021	Chromium	3.1	U
STR200021	Copper	2.6	U
STR200021	Iron	353.0	A
STR200021	Lead	2.6	U
STR200021	Manganese	4.9	A
STR200021	Nickel	1.2	U
STR200021	Selenium	2.6	U
STR200021	Silver	0.3	U
STR200021	Tin	1.2	U
STR200021	Zinc	62.0	U
STR200022	Aluminum	2290.0	
STR200022	Antimony	3.1	I
STR200022	Arsenic	3.8	I
STR200022	Cadmium	0.2	
STR200022	Chromium	4.1	I
STR200022	Copper	2.6	U
STR200022	Iron	1630.0	
STR200022	Lead	2.6	U
STR200022	Manganese	40.4	
STR200022	Nickel	2.4	I
STR200022	Selenium	2.6	U
STR200022	Silver	0.3	U
STR200022	Tin	1.2	U
STR200022	Zinc	61.0	U
STR200023	Aluminum	6990.0	

STR200023	Antimony	4.1	
STR200023	Arsenic	9.2	J
STR200023	Cadmium	0.4	
STR200023	Chromium	18.4	
STR200023	Copper	2.7	U
STR200023	Iron	3840.0	
STR200023	Lead	2.7	U
STR200023	Manganese	39.4	
STR200023	Nickel	5.6	
STR200023	Selenium	2.9	I
STR200023	Silver	0.3	U
STR200023	Tin	1.3	U
STR200023	Zinc	65.0	U
STR200025	Aluminum	2610.0	
STR200025	Antimony	3.4	
STR200025	Arsenic	1.0	U
STR200025	Cadmium	0.3	
STR200025	Chromium	9.0	I
STR200025	Copper	81.2	
STR200025	Iron	2200.0	
STR200025	Lead	2.6	U
STR200025	Manganese	30.0	
STR200025	Nickel	6.3	
STR200025	Selenium	2.6	U
STR200025	Silver	0.3	U
STR200025	Tin	1.2	U
STR200025	Zinc	62.0	U
STR200027	Aluminum	3630.0	
STR200027	Antimony	4.2	
STR200027	Arsenic	3.6	I
STR200027	Cadmium	0.3	
STR200027	Chromium	9.1	I
STR200027	Copper	2.5	U
STR200027	Iron	2170.0	
STR200027	Lead	2.5	U
STR200027	Manganese	31.1	
STR200027	Nickel	3.8	I
STR200027	Selenium	2.7	I
STR200027	Silver	0.3	U
STR200027	Tin	1.2	U
STR200027	Zinc	60.0	U
STR200028	Aluminum	4640.0	
STR200028	Antimony	4.0	
STR200028	Arsenic	1.6	I
STR200028	Cadmium	0.3	
STR200028	Chromium	8.3	I
STR200028	Copper	2.5	U
STR200028	Iron	2480.0	
STR200028	Lead	2.5	U

STR200028	Manganese	30.5	
STR200028	Nickel	4.3	I
STR200028	Selenium	2.5	U
STR200028	Silver	0.3	U
STR200028	Tin	1.2	U
STR200028	Zinc	61.0	U
STR200029	Aluminum	1030.0	
STR200029	Antimony	4.0	
STR200029	Arsenic	3.4	I
STR200029	Cadmium	0.3	
STR200029	Chromium	3.1	U
STR200029	Copper	2.6	U
STR200029	Iron	695.0	
STR200029	Lead	2.6	U
STR200029	Manganese	10.2	
STR200029	Nickel	2.4	I
STR200029	Selenium	2.6	U
STR200029	Silver	0.3	U
STR200029	Tin	1.2	U
STR200029	Zinc	62.0	U
STR200030	Aluminum	1380.0	
STR200030	Antimony	4.0	
STR200030	Arsenic	6.9	J
STR200030	Cadmium	0.3	
STR200030	Chromium	3.1	U
STR200030	Copper	2.6	U
STR200030	Iron	851.0	
STR200030	Lead	2.6	U
STR200030	Manganese	12.6	
STR200030	Nickel	2.8	I
STR200030	Selenium	2.6	U
STR200030	Silver	0.3	U
STR200030	Tin	1.2	U
STR200030	Zinc	61.0	U
STT200005	Aluminum	48200.0	
STT200005	Antimony	1.4	I
STT200005	Arsenic	5.6	J
STT200005	Cadmium	0.3	
STT200005	Chromium	72.0	
STT200005	Copper	20.0	
STT200005	Iron	28300.0	
STT200005	Lead	36.0	
STT200005	Manganese	195.0	
STT200005	Nickel	23.5	
STT200005	Selenium	3.0	U
STT200005	Silver	3.6	U
STT200005	Tin	1.4	U
STT200005	Zinc	120.0	I
STT200007	Aluminum	730.0	

STT200007	Antimony	0.7	U
STT200007	Arsenic	1.0	U
STT200007	Cadmium	0.1	U
STT200007	Chromium	3.0	U
STT200007	Copper	2.5	U
STT200007	Iron	427.0	
STT200007	Lead	2.5	U
STT200007	Manganese	8.7	
STT200007	Nickel	1.2	U
STT200007	Selenium	2.5	U
STT200007	Silver	0.3	U
STT200007	Tin	3.6	U
STT200007	Zinc	60.0	U
STT200013	Aluminum	21700.0	
STT200013	Antimony	1.5	I
STT200013	Arsenic	3.6	U
STT200013	Cadmium	0.2	
STT200013	Chromium	15.9	
STT200013	Copper	2.7	I
STT200013	Iron	7560.0	
STT200013	Lead	12.1	
STT200013	Manganese	128.0	
STT200013	Nickel	4.8	
STT200013	Selenium	2.7	U
STT200013	Silver	0.3	U
STT200013	Tin	1.3	U
STT200013	Zinc	64.0	U
STT200017	Aluminum	4220.0	
STT200017	Antimony	0.7	U
STT200017	Arsenic	1.0	U
STT200017	Cadmium	0.1	I
STT200017	Chromium	11.0	I
STT200017	Copper	18.0	
STT200017	Iron	2080.0	
STT200017	Lead	7.5	I
STT200017	Manganese	12.5	
STT200017	Nickel	2.6	I
STT200017	Selenium	2.6	U
STT200017	Silver	0.6	U
STT200017	Tin	8.0	U
STT200017	Zinc	61.0	U
STT200024	Aluminum	2790.0	
STT200024	Antimony	4.2	
STT200024	Arsenic	2.7	I
STT200024	Cadmium	0.3	
STT200024	Chromium	4.4	I
STT200024	Copper	2.6	U
STT200024	Iron	1590.0	
STT200024	Lead	2.6	U

STT200024	Manganese	34.3	
STT200024	Nickel	2.7	I
STT200024	Selenium	2.6	U
STT200024	Silver	0.3	U
STT200024	Tin	1.2	U
STT200024	Zinc	62.0	U

Table A-5. Summary of IMAP fish sampling (seines and trawls combined) summer 2000.

NUMSETS=number of sets by sampling unit in which the listed species was caught; MNABUN=mean abundance per set; PCTSETS=percent of total sets by sampling unit containing the listed species; TOTALAB=total number of individuals caught by species and sampling unit.

SAMPUNIT	SCIENTIFIC NAME	NUMSETS	MNABUN	PCTSETS	TOTALAB
APA	*Cynoscion arenarius*	19	16.89	0.79	321
APA	*Etropus crossotus*	13	9.77	0.54	127
APA	*Menticirrhus americanus*	13	4.69	0.54	61
APA	*Anchoa mitchilli*	12	401.25	0.50	4815
APA	*Chloroscombrus chrysurus*	11	14.45	0.46	159
APA	*Lagodon rhomboides*	10	8.20	0.42	82
APA	*Farfantepenaeus spp.*	10	3.80	0.42	38
APA	*Symphurus plagiusa*	10	2.10	0.42	21
APA	*Farfantepenaeus aztecus*	9	3.44	0.38	31
APA	*Synodus foetens*	9	1.44	0.38	13
APA	*Arius felis*	8	15.63	0.33	125
APA	*Eucinostomus gula*	8	7.50	0.33	60
APA	*Eucinostomus harengulus*	8	5.13	0.33	41
APA	*Eucinostomus spp.*	7	8.86	0.29	62
APA	*Callinectes sapidus*	7	3.86	0.29	27
APA	*Prionotus scitulus*	6	2.50	0.25	15
APA	*Lutjanus synagris*	6	1.67	0.25	10
APA	*Anchoa hepsetus*	5	52.00	0.21	260
APA	*Litopenaeus setiferus*	5	6.60	0.21	33
APA	*Cynoscion nebulosus*	5	5.80	0.21	29
APA	*Dasyatis sabina*	5	1.60	0.21	8
APA	*Hemicaranx amblyrhynchus*	5	1.20	0.21	6
APA	*Leiostomus xanthurus*	4	3.25	0.17	13
APA	*Peprilus alepidotus*	4	1.50	0.17	6
APA	*Syngnathus louisianae*	4	1.50	0.17	6
APA	*Chilomycterus schoepfi*	4	1.25	0.17	5
APA	*Chaetodipterus faber*	4	1.00	0.17	4
APA	*Harengula jaguana*	3	167.33	0.13	502
APA	*Ocyurus chrysurus*	3	30.67	0.13	92
APA	*Monacanthus ciliatus*	3	11.67	0.13	35
APA	*Micropogonias undulatus*	3	3.67	0.13	11
APA	*Citharichthys macrops*	3	2.00	0.13	6
APA	*Stomolophus meleagris*	3	2.00	0.13	6
APA	*Farfantepenaeus duorarum*	3	1.67	0.13	5
APA	*Paralichthys albigutta*	3	1.67	0.13	5
APA	*Syngnathus scovelli*	3	1.67	0.13	5
APA	*Sphoeroides nephelus*	3	1.33	0.13	4
APA	*Callinectes similis*	3	1.00	0.13	3
APA	*Monacanthus hispidus*	2	4.00	0.08	8
APA	*Orthopristis chrysoptera*	2	4.00	0.08	8
APA	*Symphurus parvus*	2	1.50	0.08	3

APA	*Aluterus schoepfi*	2	1.00	0.08	2
APA	*Gobionellus boleosoma*	2	1.00	0.08	2
APA	*Microgobius gulosus*	2	1.00	0.08	2
APA	*Peprilus burti*	2	1.00	0.08	2
APA	*Porichthys plectrodon*	2	1.00	0.08	2
APA	*Trinectes maculatus*	2	1.00	0.08	2
APA	*Bairdiella chrysoura*	1	40.00	0.04	40
APA	*Carangidae spp.*	1	3.00	0.04	3
APA	*Bagre marinus*	1	2.00	0.04	2
APA	*Lutjanus griseus*	1	2.00	0.04	2
APA	*Membras spp.*	1	2.00	0.04	2
APA	*Archosargus probatocephalus*	1	1.00	0.04	1
APA	*Centropristis striata*	1	1.00	0.04	1
APA	*Gobiidae spp.*	1	1.00	0.04	1
APA	*Gobiosoma bosc*	1	1.00	0.04	1
APA	*Hippocampus erectus*	1	1.00	0.04	1
APA	*Lactophrys quadricornis*	1	1.00	0.04	1
APA	*Mycteroperca microlepis*	1	1.00	0.04	1
APA	*Prionotus tribulus*	1	1.00	0.04	1
APA	*Scomberomorus maculatus*	1	1.00	0.04	1
APA	*Stenotomus caprinus*	1	1.00	0.04	1
LKW	*Eucinostomus spp.*	17	9.47	0.57	161
LKW	*Farfantepenaeus duorarum*	13	2.85	0.43	37
LKW	*Eucinostomus harengulus*	11	16.09	0.37	177
LKW	*Eucinostomus gula*	11	10.36	0.37	114
LKW	*Callinectes sapidus*	6	2.67	0.20	16
LKW	*Eucinostomus argenteus*	5	25.00	0.17	125
LKW	*Lutjanus synagris*	5	1.40	0.17	7
LKW	*Trinectes maculatus*	4	16.75	0.13	67
LKW	*Sphoeroides spengleri*	4	1.50	0.13	6
LKW	*Microgobius gulosus*	4	1.00	0.13	4
LKW	*Oligoplites saurus*	3	2.33	0.10	7
LKW	*Centropomus undecimalis*	3	1.67	0.10	5
LKW	*Strongylura notata*	3	1.67	0.10	5
LKW	*Achirus lineatus*	3	1.33	0.10	4
LKW	*Arius felis*	3	1.33	0.10	4
LKW	*Chaetodipterus faber*	3	1.33	0.10	4
LKW	*Sphoeroides testudineus*	3	1.33	0.10	4
LKW	*Syacium papillosum*	3	1.00	0.10	3
LKW	*Anchoa mitchilli*	2	126.50	0.07	253
LKW	*Haemulon aurolineatum*	2	6.00	0.07	12
LKW	*Micropogonias undulatus*	2	2.50	0.07	5
LKW	*Syngnathus scovelli*	2	2.00	0.07	4
LKW	*Eucinostomus jonesi*	2	1.50	0.07	3
LKW	*Lactophrys quadricornis*	2	1.50	0.07	3
LKW	*Archosargus rhomboidalis*	2	1.00	0.07	2
LKW	*Lactophrys trigonus*	2	1.00	0.07	2
LKW	*Lagodon rhomboides*	2	1.00	0.07	2

LKW	*Microgobius microlepis*	2	1.00	0.07	2
LKW	*Scorpaena grandicornis*	2	1.00	0.07	2
LKW	*Selene vomer*	2	1.00	0.07	2
LKW	*Syngnathus louisianae*	2	1.00	0.07	2
LKW	*Atherinomorus stipes*	1	23.00	0.03	23
LKW	*Menticirrhus americanus*	1	12.00	0.03	12
LKW	*Haemulon sciurus*	1	8.00	0.03	8
LKW	*Gobionellus stigmaturus*	1	5.00	0.03	5
LKW	*Archosargus probatocephalus*	1	4.00	0.03	4
LKW	*Gobionellus boleosoma*	1	4.00	0.03	4
LKW	*Paralichthys lethostigma*	1	3.00	0.03	3
LKW	*Pogonias cromis*	1	3.00	0.03	3
LKW	*Citharichthys spilopterus*	1	2.00	0.03	2
LKW	*Albula vulpes*	1	1.00	0.03	1
LKW	*Bothus ocellatus*	1	1.00	0.03	1
LKW	*Chilomycterus schoepfi*	1	1.00	0.03	1
LKW	*Diplogrammus pauciradiatus*	1	1.00	0.03	1
LKW	*Gerres cinereus*	1	1.00	0.03	1
LKW	*Hippocampus erectus*	1	1.00	0.03	1
LKW	*Lophogobius cyprinoides*	1	1.00	0.03	1
LKW	*Monacanthus hispidus*	1	1.00	0.03	1
LKW	*Nicholsina usta*	1	1.00	0.03	1
LKW	*Prionotus scitulus*	1	1.00	0.03	1
LKW	*Scorpaena brasiliensis*	1	1.00	0.03	1
LKW	*Sphoeroides nephelus*	1	1.00	0.03	1
LKW	*Sphyraena barracuda*	1	1.00	0.03	1
LKW	*Strongylura spp.*	1	1.00	0.03	1
LKW	*Synodus foetens*	1	1.00	0.03	1
LKW	*Diplectrum formosum*	1		0.03	0
NSJ	*Anchoa mitchilli*	21	22.29	0.75	468
NSJ	*Callinectes sapidus*	17	1.24	0.61	21
NSJ	*Farfantepenaeus duorarum*	16	6.50	0.57	104
NSJ	*Litopenaeus setiferus*	9	2.78	0.32	25
NSJ	*Eucinostomus spp.*	8	6.63	0.29	53
NSJ	*Eucinostomus harengulus*	8	6.13	0.29	49
NSJ	*Chloroscombrus chrysurus*	7	3.14	0.25	22
NSJ	*Callinectes similis*	7	1.71	0.25	12
NSJ	*Anchoa hepsetus*	6	23.50	0.21	141
NSJ	*Synodus foetens*	6	2.17	0.21	13
NSJ	*Citharichthys spilopterus*	6	1.50	0.21	9
NSJ	*Menticirrhus americanus*	6	1.50	0.21	9
NSJ	*Menidia spp.*	5	28.80	0.18	144
NSJ	*Achirus lineatus*	5	4.60	0.18	23
NSJ	*Portunus spp.*	5	2.80	0.18	14
NSJ	*Syngnathus louisianae*	5	1.40	0.18	7
NSJ	*Fundulus grandis*	4	9.50	0.14	38
NSJ	*Micropogonias undulatus*	4	2.75	0.14	11
NSJ	*Symphurus plagiusa*	3	5.33	0.11	16

NSJ	*Cynoscion regalis*	3	3.67	0.11	11
NSJ	*Microgobius thalassinus*	3	3.33	0.11	10
NSJ	*Sphoeroides nephelus*	3	3.33	0.11	10
NSJ	*Leiostomus xanthurus*	3	1.33	0.11	4
NSJ	*Trinectes maculatus*	3	1.33	0.11	4
NSJ	*Anchoa spp.*	2	57.00	0.07	114
NSJ	*Trachinotus carolinus*	2	11.00	0.07	22
NSJ	*Trachinotus falcatus*	2	10.00	0.07	20
NSJ	*Etropus crossotus*	2	3.00	0.07	6
NSJ	*Oligoplites saurus*	2	3.00	0.07	6
NSJ	*Gobiosoma robustum*	2	2.00	0.07	4
NSJ	*Eucinostomus gula*	2	1.50	0.07	3
NSJ	*Ictalurus punctatus*	2	1.50	0.07	3
NSJ	*Monacanthus hispidus*	2	1.50	0.07	3
NSJ	*Prionotus scitulus*	2	1.50	0.07	3
NSJ	*Cynoscion nebulosus*	2	1.00	0.07	2
NSJ	*Dasyatis sabina*	2	1.00	0.07	2
NSJ	*Paralichthys lethostigma*	2	1.00	0.07	2
NSJ	*Menidae spp.*	1	16.00	0.04	16
NSJ	*Monacanthus spp.*	1	6.00	0.04	6
NSJ	*Eucinostomus argenteus*	1	4.00	0.04	4
NSJ	*Bairdiella chrysoura*	1	3.00	0.04	3
NSJ	*Anchoa lamprotaenia*	1	2.00	0.04	2
NSJ	*Farfantepenaeus aztecus*	1	2.00	0.04	2
NSJ	*Lutjanus synagris*	1	2.00	0.04	2
NSJ	*Archosargus probatocephalus*	1	1.00	0.04	1
NSJ	*Bagre marinus*	1	1.00	0.04	1
NSJ	*Chaetodipterus faber*	1	1.00	0.04	1
NSJ	*Fundulus heteroclitus*	1	1.00	0.04	1
NSJ	*Gobiosoma bosc*	1	1.00	0.04	1
NSJ	*Mugil cephalus*	1	1.00	0.04	1
NSJ	*Mugil curema*	1	1.00	0.04	1
NSJ	*Paralichthys albigutta*	1	1.00	0.04	1
NSJ	*Poecilia latipinna*	1	1.00	0.04	1
NSJ	*Strongylura notata*	1	1.00	0.04	1
NSJ	*Strongylura timucu*	1	1.00	0.04	1
NSJ	*Syngnathus scovelli*	1	1.00	0.04	1
NSJ	*Trachinotus spp.*	1	1.00	0.04	1
ST	*Eucinostomus gula*	20	6.45	0.69	129
ST	*Eucinostomus spp.*	18	15.67	0.62	282
ST	*Lagodon rhomboides*	17	17.24	0.59	293
ST	*Callinectes sapidus*	11	1.91	0.38	21
ST	*Anchoa mitchilli*	10	31.30	0.34	313
ST	*Farfantepenaeus duorarum*	10	5.20	0.34	52
ST	*Bairdiella chrysoura*	8	8.25	0.28	66
ST	*Prionotus scitulus*	8	5.88	0.28	47
ST	*Lutjanus synagris*	8	3.38	0.28	27
ST	*Orthopristis chrysoptera*	8	3.25	0.28	26

ST	*Monacanthus ciliatus*	8	2.88	0.28	23
ST	*Lactophrys quadricornis*	8	2.25	0.28	18
ST	*Monacanthus hispidus*	7	12.00	0.24	84
ST	*Chilomycterus schoepfi*	7	1.29	0.24	9
ST	*Lutjanus griseus*	6	16.33	0.21	98
ST	*Eucinostomus harengulus*	6	11.67	0.21	70
ST	*Cynoscion nebulosus*	6	2.83	0.21	17
ST	*Syngnathus louisianae*	6	1.17	0.21	7
ST	*Haemulon plumieri*	5	9.20	0.17	46
ST	*Chloroscombrus chrysurus*	5	5.80	0.17	29
ST	*Floridichthys carpio*	5	4.20	0.17	21
ST	*Calamus arctifrons*	5	3.20	0.17	16
ST	*Achirus lineatus*	5	1.60	0.17	8
ST	*Synodus foetens*	5	1.40	0.17	7
ST	*Menidia spp.*	4	24.00	0.14	96
ST	*Ocyurus chrysurus*	4	9.00	0.14	36
ST	*Leiostomus xanthurus*	4	7.75	0.14	31
ST	*Gobiosoma robustum*	4	2.50	0.14	10
ST	*Lachnolaimus maximus*	4	2.25	0.14	9
ST	*Paralichthys albigutta*	4	2.25	0.14	9
ST	*Syngnathus scovelli*	4	2.25	0.14	9
ST	*Anchoa hepsetus*	4	2.00	0.14	8
ST	*Nicholsina usta*	4	1.75	0.14	7
ST	*Dasyatis sabina*	4	1.25	0.14	5
ST	*Etropus crossotus*	4	1.00	0.14	4
ST	*Lucania parva*	3	384.33	0.10	1153
ST	*Cynoscion arenarius*	3	15.33	0.10	46
ST	*Callinectes similis*	3	4.67	0.10	14
ST	*Menticirrhus americanus*	3	3.00	0.10	9
ST	*Oligoplites saurus*	3	3.00	0.10	9
ST	*Diplectrum formosum*	3	2.67	0.10	8
ST	*Microgobius gulosus*	3	1.67	0.10	5
ST	*Symphurus plagiusa*	3	1.67	0.10	5
ST	*Hippocampus erectus*	3	1.33	0.10	4
ST	*Syngnathus floridae*	3	1.33	0.10	4
ST	*Opsanus beta*	3	1.00	0.10	3
ST	*Panulirus argus*	3	1.00	0.10	3
ST	*Tilapia spp.*	2	6.50	0.07	13
ST	*Litopenaeus setiferus*	2	6.00	0.07	12
ST	*Farfantepenaeus aztecus*	2	5.00	0.07	10
ST	*Membras martinica*	2	4.00	0.07	8
ST	*Hippocampus zosterae*	2	3.50	0.07	7
ST	*Archosargus probatocephalus*	2	2.50	0.07	5
ST	*Microgobius microlepis*	2	2.50	0.07	5
ST	*Citharichthys spilopterus*	2	2.00	0.07	4
ST	*Sphoeroides nephelus*	2	2.00	0.07	4
ST	*Arius felis*	2	1.00	0.07	2
ST	*Chaetodipterus faber*	2	1.00	0.07	2

ST	*Opisthonema oglinum*	2	1.00	0.07	2
ST	*Penaeidae spp.*	2	1.00	0.07	2
ST	*Micropogonias undulatus*	1	18.00	0.03	18
ST	*Menticirrhus spp.*	1	11.00	0.03	11
ST	*Fundulus grandis*	1	8.00	0.03	8
ST	*Diapterus auratus*	1	4.00	0.03	4
ST	*Cynoscion regalis*	1	3.00	0.03	3
ST	*Eucinostomus lefroyi*	1	3.00	0.03	3
ST	*Gobionellus oceanicus*	1	3.00	0.03	3
ST	*Hypoplectrus unicolor*	1	3.00	0.03	3
ST	*Scorpaena brasiliensis*	1	2.00	0.03	2
ST	*Symphurus parvus*	1	2.00	0.03	2
ST	*Aluterus schoepfi*	1	1.00	0.03	1
ST	*Anarchopterus criniger*	1	1.00	0.03	1
ST	*Ancylopsetta quadrocellata*	1	1.00	0.03	1
ST	*Archosargus rhomboidalis*	1	1.00	0.03	1
ST	*Bairdiella batabana*	1	1.00	0.03	1
ST	*Bathygobius curacao*	1	1.00	0.03	1
ST	*Citharichthys macrops*	1	1.00	0.03	1
ST	*Cosmocampus albirostris*	1	1.00	0.03	1
ST	*Dasyatis say*	1	1.00	0.03	1
ST	*Diplogrammus pauciradiatus*	1	1.00	0.03	1
ST	*Farfantepenaeus spp.*	1	1.00	0.03	1
ST	*Gobionellus spp.*	1	1.00	0.03	1
ST	*Gobiosoma bosc*	1	1.00	0.03	1
ST	*Haemulon parrai*	1	1.00	0.03	1
ST	*Lactophrys triqueter*	1	1.00	0.03	1
ST	*Limulus polyphemus*	1	1.00	0.03	1
ST	*Lutjanus analis*	1	1.00	0.03	1
ST	*Menippe spp.*	1	1.00	0.03	1
ST	*Mercenaria mercenaria*	1	1.00	0.03	1
ST	*Microgobius spp.*	1	1.00	0.03	1
ST	*Mugil cephalus*	1	1.00	0.03	1
ST	*Mugil curema*	1	1.00	0.03	1
ST	*Ogcocephalus radiatus*	1	1.00	0.03	1
ST	*Ophichthus gomesi*	1	1.00	0.03	1
ST	*Paraclinus marmoratus*	1	1.00	0.03	1
ST	*Paralichthys lethostigma*	1	1.00	0.03	1
ST	*Prionotus tribulus*	1	1.00	0.03	1
ST	*Sparisoma chrysopterum*	1	1.00	0.03	1
ST	*Sparisoma radians*	1	1.00	0.03	1
ST	*Sphoeroides spengleri*	1	1.00	0.03	1
ST	*Strongylura spp.*	1	1.00	0.03	1
ST	*Trinectes maculatus*	1	1.00	0.03	1
ST	*Menippe mercenaria*	1		0.03	0
SUW	*Cynoscion arenarius*	17	43.53	0.81	740
SUW	*Menticirrhus americanus*	15	18.00	0.71	270
SUW	*Farfantepenaeus spp.*	12	18.00	0.57	216

SUW	*Callinectes sapidus*	12	3.67	0.57	44
SUW	*Anchoa mitchilli*	11	143.73	0.52	1581
SUW	*Lagodon rhomboides*	11	7.91	0.52	87
SUW	*Eucinostomus gula*	10	5.60	0.48	56
SUW	*Chloroscombrus chrysurus*	10	2.80	0.48	28
SUW	*Dasyatis sabina*	10	1.50	0.48	15
SUW	*Etropus crossotus*	9	10.00	0.43	90
SUW	*Bairdiella chrysoura*	9	8.56	0.43	77
SUW	*Eucinostomus spp.*	8	16.75	0.38	134
SUW	*Chaetodipterus faber*	7	6.57	0.33	46
SUW	*Orthopristis chrysoptera*	6	8.00	0.29	48
SUW	*Arius felis*	5	46.40	0.24	232
SUW	*Anchoa hepsetus*	5	5.20	0.24	26
SUW	*Symphurus plagiusa*	5	4.80	0.24	24
SUW	*Prionotus scitulus*	5	3.00	0.24	15
SUW	*Chilomycterus schoepfi*	5	1.40	0.24	7
SUW	*Menticirrhus spp.*	4	14.75	0.19	59
SUW	*Cynoscion nebulosus*	4	1.50	0.19	6
SUW	*Membras martinica*	3	11.00	0.14	33
SUW	*Leiostomus xanthurus*	3	3.67	0.14	11
SUW	*Syngnathus floridae*	3	3.00	0.14	9
SUW	*Syngnathus scovelli*	3	3.00	0.14	9
SUW	*Bagre marinus*	3	2.33	0.14	7
SUW	*Eucinostomus harengulus*	3	2.33	0.14	7
SUW	*Selene vomer*	3	2.33	0.14	7
SUW	*Opisthonema oglinum*	3	1.67	0.14	5
SUW	*Paralichthys albigutta*	3	1.67	0.14	5
SUW	*Gobiosoma robustum*	3	1.00	0.14	3
SUW	*Opsanus beta*	3	1.00	0.14	3
SUW	*Harengula jaguana*	2	22.50	0.10	45
SUW	*Ogcocephalus radiatus*	2	4.00	0.10	8
SUW	*Gobiosoma bosc*	2	3.50	0.10	7
SUW	*Fundulus grandis*	2	3.00	0.10	6
SUW	*Menippe spp.*	2	2.50	0.10	5
SUW	*Lutjanus griseus*	2	1.50	0.10	3
SUW	*Ogcocephalus cubifrons*	2	1.50	0.10	3
SUW	*Lactophrys quadricornis*	2	1.00	0.10	2
SUW	*Monacanthus hispidus*	2	1.00	0.10	2
SUW	*Oligoplites saurus*	2	1.00	0.10	2
SUW	*Dasyatis americana*	1	6.00	0.05	6
SUW	*Prionotus tribulus*	1	4.00	0.05	4
SUW	*Microgobius gulosus*	1	3.00	0.05	3
SUW	*Lutjanus synagris*	1	2.00	0.05	2
SUW	*Strongylura notata*	1	2.00	0.05	2
SUW	*Achirus lineatus*	1	1.00	0.05	1
SUW	*Bathygobius soporator*	1	1.00	0.05	1
SUW	*Centropristis striata*	1	1.00	0.05	1
SUW	*Chasmodes saburrae*	1	1.00	0.05	1

SUW	*Diplodus holbrooki*	1	1.00	0.05	1
SUW	*Etropus spp.*	1	1.00	0.05	1
SUW	*Gymnura micrura*	1	1.00	0.05	1
SUW	*Hippocampus erectus*	1	1.00	0.05	1
SUW	*Microgobius thalassinus*	1	1.00	0.05	1
SUW	*Pogonias cromis*	1	1.00	0.05	1
SUW	*Strongylura timucu*	1	1.00	0.05	1
SUW	*Syngnathus louisianae*	1	1.00	0.05	1
TAM	*Prionotus scitulus*	24	5.70	0.92	137
TAM	*Lagodon rhomboides*	15	23.80	0.58	357
TAM	*Eucinostomus spp.*	14	12.64	0.54	177
TAM	*Cynoscion arenarius*	14	7.00	0.54	98
TAM	*Anchoa mitchilli*	11	69.09	0.42	760
TAM	*Orthopristis chrysoptera*	11	19.45	0.42	214
TAM	*Chilomycterus schoepfi*	11	9.82	0.42	108
TAM	*Syngnathus louisianae*	11	1.91	0.42	21
TAM	*Synodus foetens*	11	1.64	0.42	18
TAM	*Menticirrhus americanus*	9	12.22	0.35	110
TAM	*Arius felis*	9	6.78	0.35	61
TAM	*Paralichthys albigutta*	8	2.00	0.31	16
TAM	*Lactophrys quadricornis*	8	1.63	0.31	13
TAM	*Eucinostomus gula*	7	17.14	0.27	120
TAM	*Anchoa hepsetus*	7	1.57	0.27	11
TAM	*Symphurus plagiusa*	7	1.43	0.27	10
TAM	*Dasyatis sabina*	6	1.83	0.23	11
TAM	*Etropus crossotus*	5	2.00	0.19	10
TAM	*Farfantepenaeus duorarum*	5	2.00	0.19	10
TAM	*Achirus lineatus*	5	1.60	0.19	8
TAM	*Microgobius thalassinus*	4	5.00	0.15	20
TAM	*Chaetodipterus faber*	4	1.75	0.15	7
TAM	*Dasyatis say*	4	1.25	0.15	5
TAM	*Sphoeroides nephelus*	4	1.25	0.15	5
TAM	*Callinectes sapidus*	4	1.00	0.15	4
TAM	*Bairdiella chrysoura*	3	43.67	0.12	131
TAM	*Leiostomus xanthurus*	3	4.33	0.12	13
TAM	*Monacanthus hispidus*	3	3.67	0.12	11
TAM	*Syngnathus floridae*	3	3.00	0.12	9
TAM	*Citharichthys macrops*	3	1.67	0.12	5
TAM	*Eucinostomus harengulus*	3	1.33	0.12	4
TAM	*Lucania parva*	2	294.00	0.08	588
TAM	*Menidia spp.*	2	15.50	0.08	31
TAM	*Trinectes maculatus*	2	2.00	0.08	4
TAM	*Diplodus holbrooki*	2	1.50	0.08	3
TAM	*Microgobius gulosus*	2	1.50	0.08	3
TAM	*Aluterus schoepfi*	2	1.00	0.08	2
TAM	*Chloroscombrus chrysurus*	2	1.00	0.08	2
TAM	*Cynoscion nebulosus*	2	1.00	0.08	2
TAM	*Gobiosoma spp.*	2	1.00	0.08	2

TAM	*Anchoa cubana*	1	178.00	0.04	178
TAM	*Harengula jaguana*	1	175.00	0.04	175
TAM	*Calamus arctifrons*	1	3.00	0.04	3
TAM	*Gobiosoma robustum*	1	3.00	0.04	3
TAM	*Penaeidae spp.*	1	3.00	0.04	3
TAM	*Syngnathus scovelli*	1	3.00	0.04	3
TAM	*Floridichthys carpio*	1	2.00	0.04	2
TAM	*Mercenaria mercenaria*	1	2.00	0.04	2
TAM	*Apogon quadrisquamatus*	1	1.00	0.04	1
TAM	*Bagre marinus*	1	1.00	0.04	1
TAM	*Diapterus plumieri*	1	1.00	0.04	1
TAM	*Farfantepenaeus spp.*	1	1.00	0.04	1
TAM	*Lactophrys spp.*	1	1.00	0.04	1
TAM	*Limulus polyphemus*	1	1.00	0.04	1
TAM	*Menippe spp.*	1	1.00	0.04	1
TAM	*Oligoplites saurus*	1	1.00	0.04	1
TAM	*Opisthonema oglinum*	1	1.00	0.04	1
TAM	*Opsanus beta*	1	1.00	0.04	1
TAM	*Strongylura timucu*	1	1.00	0.04	1

Appendix B

IMAP Metadata from the Florida Marine Research Institute's Metadata Management System

Inshore Marine Monitoring and Assessment Program (IMAP) Database

Identification_Information
Entity_and_Attribute_Information

Identification Information

Section Index

Citation:
Citation Information:
Title: Inshore Marine Monitoring and Assessment Program (IMAP) Database
Description:
Abstract:

Florida's inshore marine resources are one of the state's most valuable assets. They are unique and diverse, ranging from major embayments and lagoons to smaller estuaries at river mouths to tidal marshes and mangrove forests which merge directly with the sea. IMAP is a collaborative project between EPA and the FWC Florida Marine Research Institute (FMRI) designed to asses the ecological condition of Florida's inshore waters using a set of ecological indicators. Much of the field capability for IMAP will be provided by FMRI's Fisheries Independent Monitoring Program (FIM). The FIM program operates out of FMRI field labs in Apalachicola, Cedar Key, Tampa Bay, Charlotte Harbor, Marathon, Tequesta, and Melbourne. To ensure that sample locations are selected in an unbiased manner, a hexagonal grid is used to define sampling areas in IMAP. IMAP samples on two different scales: statewide and regional. The regions correspond to florida's 5 Water Management Districts (WMD). at both scales, sample sites are determined ramdomly within a network of hexagonal grids. IMAP does not have the resources to characterize the variation in each indicator over fine spatial and temporal scales. Because of this limitation, the IMAP sampling design focuses on characterizing spatial differences. IMAP will sample only once a year, but cover several locations throughout the state during each sampling period. In order for this strategy to work, there must be an identifiable time window (an index period) within which inshore resources are under significant stress, and conditions are not changing dramatically. Although there are exceptions, for most of Florida, a late summer index period meets these criteria. Under this framework, IMAP will sample 180 stations each year during a concentrated late-summer index period. IMAP indicators are environmental measurements that are used to reflect the quality of the ecosystem from which they are sampled. It is critical that these indicators are 1) responsive to environmental problems (such as pollution or nutrient enrichment), 2) easily measured, and 3) representative of the area being sampled. Highly mobile organisms or those that are tolerant of environmental pollution are not good choices in this type of program. The indicators chosen for IMAP can be divided into two broad categories: physical/chemical and biological. Physical/chemical indicators chosen for IMAP include the traditional water quality measurements such as temperature, salinity, dissolved oxygen, and pH, in addition to nutrients and chlorophyll a, which are indicators of productivity. Most water quality measurements will be obtained using an automated sampler (Hydrolab). Environmental contamination will be assessed by collecting both sediment and fish tissue for chemical analyses. IMAP biological indicators integrate environmental stressors over larger spatial and temporal scales. Fish, crabs and shrimp will be sampled with trawls and seines. Community composition will be assessed by identifying and counting all animals in the sample. In addition, all fish and shrimp will be examined for gross external pathologies (lumps, lesions, ulcers, skeletal abnormalities) and any abnormal individuals will be returned to the lab for pathological examination. Seagrass community composition will be assessed with two methods: 1) a visual examination of % cover occupied by each species, and 2) a core sample in which seagrasses and the underlying sediment are returned to the lab for detailed analyses. Benthic macroinvertebrates will be sampled to determine community composition and the occurrence of pollution tolerant or intolerant species. Some dinoflagellates produce toxins that are harmful to marine life. These organisms are extremely small so the toxins they produce are only a problem when they are very numerous (that is, when an algae bloom occurs). Recent studies indicate that several different types of dinoflagellates form resting cysts in the sediments. There is a need to determine how numerous these cysts are and under what conditions they are found. IMAP will collect sediments and use them in a laboratory procedure (microalgal assay) which will bring the dinoflagellates out of their resting stage so they can be identified.
Most IMAP indicators will be sampled at both statewide and regional scales. Some indicators, such as contaminants in fish and sediments, and sediment samples for dinoflagellate cysts, will be sampled only at the statewide scale. A complete list of IMAP indicators is available from FMRI. An IMAP statistical summary will be produced annually. The "take-home message" of this report will be area-based assessments of ecological condition. These estimates will indicate the percentage of inshore area that was above or below threshold values for each indicator (for example, "95% of insore area in Florida had bottom dissolved oxygen concentrations > 2 mg/L"). The IMAP sample design allows the calculation of estimates of precision on the estimates so it is possible to communicate how precise our assessments are for each indicator. IMAP reports will be designed to communicate results to varying audiences (scientists, public, legislature, etc.). IMAP serves as the inshore marine component of an Integrated Water Resource Monitoring

Network (IWRMN). Within this network, the Department of Environmental Protection (DEP) Ambient Monitoring Program samples freshwater lakes, streams and groundwater, while IMAP samples estuaries. Sampling schedules are coordinated so that the two programs are in the same regions during the same years. This integrated approach will allow the state of Florida to comprehensively assess the quality of all water resources within a region. IMAP began full-scale sampling in summer, 2000 and is funded by EPA through 2003. It is anticipated that additional funding will be secured to continue the program on a long-term basis. The sampling schedule for all five years is available from FMRI.

Time Period of Content:
Time Period Information:
Single Date/Time:
Calendar Date: 11/1/1999
Time of Day: Unknown

Status:
Progress: In Work
Maintenance and Update Frequency: Continually

Point of Contact:
Contact Information:
Contact Person Primary:
Contact Person: Gil McRae
Contact Organization: Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute
Contact Address:
Address Type: mailing and physical address
Address: 100 8th Avenue SE
City: St. Petersburg
State or Province: Florida
Postal Code: 33701-5095
Country: USA
Contact Voice Telephone: (727) 896-8626
Contact Electronic Mail Address: gil.mcrae@fwc.state.fl.us

Entity and Attribute Information

Section Index

Detailed Description:
Entity Type:
Entity Type Label: Initial Sampling Main Record
Entity Type Definition: Information pertaining to the actual visitation of the site to be sampled during the primary examination
Attribute:
Attribute Label: Actual Latitude
Attribute Definition: Latitude recorded at sampling site.
Attribute Value Accuracy Information:
Attribute Value Accuracy Explanation: Information is captured in both decimal degrees and degrees and decimal minutes. Decimal degrees may be calculated from degrees and decimal minutes.
Attribute Measurement Frequency: Required on every record
Attribute:
Attribute Label: Actual Longitude
Attribute Definition: Longitude recorded at sampling site.
Attribute Value Accuracy Information:
Attribute Value Accuracy Explanation: Information is captured in both decimal degrees and degrees and decimal minutes. Decimal degrees may be calculated from degrees and decimal minutes.
Attribute Measurement Frequency: Required on every record
Attribute:
Attribute Label: Bay
Attribute Definition: Two alpha character code used for the identification of an area in which the sample was taken
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: AP
Enumerated Domain Value Definition: Apalachicola Bay
Enumerated Domain Value: CH
Enumerated Domain Value Definition: Charlotte Harbor Bay
Enumerated Domain Value: CK
Enumerated Domain Value Definition: Cedar Key Bay
Enumerated Domain Value: IR
Enumerated Domain Value Definition: Indian River Bay
Enumerated Domain Value: KY
Enumerated Domain Value Definition: Florida Keys Bay
Enumerated Domain Value: SA
Enumerated Domain Value Definition: Santa Rosa Bay
Enumerated Domain Value: TB
Enumerated Domain Value Definition: Tampa Bay

Enumerated Domain Value: TQ
Enumerated Domain Value Definition: Tequesta Bay

Attribute Measurement Frequency: Required on every record

Attribute:

Attribute Label: Boat

Attribute Definition: Single alphanumeric character used to identify boat used to conduct sampling.

Attribute Definition Source: FIM data manual

Attribute Domain Values:

Enumerated Domain:

Enumerated Domain Value: Available from "FIMCodes" table "Comments" field.

Attribute Value Accuracy Information:

Attribute Value Accuracy Explanation: Null value available when no boat was used.

Attribute Measurement Frequency: Required on every record

Attribute:

Attribute Label: Collection Number

Attribute Definition: Four digit number used to identify sample collection (year 2000 definition)

Attribute Measurement Frequency: Required on every record

Attribute:

Attribute Label: Crew1

Attribute Definition: Initals of crew member who comprised the sampling team.

Attribute Measurement Frequency: As needed

Attribute:

Attribute Label: Crew2

Attribute Definition: Initals of crew member who comprised the sampling team.

Attribute Measurement Frequency: As needed

Attribute:

Attribute Label: Crew3

Attribute Definition: Initals of crew member who comprised the sampling team.

Attribute Measurement Frequency: As needed

Attribute:

Attribute Label: Crew4

Attribute Definition: Initals of crew member who comprised the sampling team.

Attribute Measurement Frequency: As needed

Attribute:

Attribute Label: Distance from Target

Attribute Definition: Calculated estimation of distance between Actual location and Target location in nautical miles.

Attribute Definition Source: http://nmml.afsc.noaa.gov/Software/ExcelGeoFunctions/excelgeofunc.htm

Attribute Value Accuracy Information:

Attribute Value Accuracy Explanation: 60 * arccos(Sin(Rlat1) * Sin(Rlat2) + Cos(Rlat1) * Cos(Rlat2) * Cos(Rlon))

Attribute Measurement Frequency: Required where "Actual Coordinates" were measured.

Attribute:

Attribute Label: F,M,G

Attribute Definition: Code used to identify sampling methodology. Default is M for the IMAP project

Attribute Measurement Frequency: Required on every record

Attribute:

Attribute Label: FIM Number

Attribute Definition: Code used to connect an IMAP record set to the FIM database.

Attribute Measurement Frequency: Required on every record

Attribute:

Attribute Label: Gear

Attribute Definition: Numeric code used to identify sampling gear used and method it was deployed.

Attribute Definition Source: FIM Data Manual

Attribute Domain Values:

Enumerated Domain:

Enumerated Domain Value: See database "Gear Codes" table, "Comments" field for definitions
Enumerated Domain Value Definition Source: FIM Data Manual

Attribute Measurement Frequency: Required on every record containing Fisheries information

Attribute:

Attribute Label: Instrument

Attribute Definition: Single alpha character used to indicated instrument used to capture location Latitude and Longitude of sampling site.

Attribute Definition Source: FIM data manual

Attribute Domain Values:

Enumerated Domain:

Enumerated Domain Value: L
Enumerated Domain Value Definition: Loran
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: C
Enumerated Domain Value Definition: Chart
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: D

Enumerated Domain Value Definition: Differential GPS
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: G
Enumerated Domain Value Definition: GPS (Not differencial)
Enumerated Domain Value Definition Source: FIM Data Manual
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Primary Investigator
Attribute Definition: Initals of Primary Investigator who headed the sampling team.
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Project
Attribute Definition: Single alpha character code used to identify project samples were collected for. Default for IMAP is I.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: R
Enumerated Domain Value Definition: River Sampling
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: M
Enumerated Domain Value Definition: Regular FIM Sampling
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: I
Enumerated Domain Value Definition: IMAP
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: H
Enumerated Domain Value Definition: Hatchery Release Monitoring
Enumerated Domain Value Definition Source: FIM data manual
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Reference
Attribute Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatination of the sampling date, an "@" symbol, and the station code.
Attribute Definition Source: Thomas Corbin
Beginning Date of Attribute Values: Initial Sampling start date
Ending Date of Attribute Values: Initial Sampling end date
Attribute Value Accuracy Information:
Attribute Value Accuracy Explanation: Dependent upon entry of information used to create field.
Attribute Measurement Frequency: Every Record

Attribute:
Attribute Label: Rep
Attribute Definition: Number indicating which net set the recorded samples came from. Default of 1.
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Sampling date
Attribute Definition: Date when IMAP site was initally visited and sampled
Beginning Date of Attribute Values: Not less than 2000
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Start Depth
Attribute Definition: Depth of station at the start of sampling. Measured in meters
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Start Time
Attribute Definition: Start time sampling began at site. Captured in 24 hour military time.
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Station code
Attribute Definition:
Code used to identify location of the sampling site. Consists of three alpha characters depicting the sampling type, four numeric characters depicting the year sampling will occur, and up to three numeric characters depicting the individual site.
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Strata
Attribute Definition: Single alpha character used to indicated stratum sampled.
Attribute Definition Source: FIM data manual
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: A
Enumerated Domain Value Definition: Offshore seine over grass
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: B

Enumerated Domain Value Definition: Offshore seine not over grass
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: C
Enumerated Domain Value Definition: Boat seine with overhanging vegetation
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: D
Enumerated Domain Value Definition: Boat seine without overhanging vegetation
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: S

Attribute:
Attribute Label: Target Latitude
Attribute Definition: Latitude established by EPA as target site.
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Target Longitude
Attribute Definition: Longitude established by EPA as target site.
Attribute Measurement Frequency: Required on every record

Detailed Description:

Entity Type:
Entity Type Label: HydroLab Data Capture Subform
Entity Type Definition: Water quality information captured by use of an instrument package lowered at the site of sampling.

Attribute:
Attribute Label: Conductivity
Attribute Definition: Specific conductance reading taken at depth.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Conductivity Instrument
Attribute Definition: Instrument used to measure specific conductance. Defaults to the "HydroLab Used" field value.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Depth
Attribute Definition: Depth in meters that the following measurements were taken.
Attribute Measurement Frequency: Required on every HydroLab entry

Attribute:
Attribute Label: Dissolved Oxygen
Attribute Definition: Dissolved oxygen reading taken at depth. Measured in milligrams per Liter.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Dissolved Oxygen Instrument
Attribute Definition: Instrument used to measure D.O.. Defaults to the "HydroLab Used" field value.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Field Lab
Attribute Definition: FWCC Field Laboratory that owns the equipment package used to capture readings.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: Tampa Bay
Enumerated Domain Value Definition: FWCC Florida Marine Research Institute, Saint Petersburg, Florida
Enumerated Domain Value: Tequesta
Enumerated Domain Value Definition: FWCC Field Lab station, Tequesta, Florida
Enumerated Domain Value: Indian River
Enumerated Domain Value Definition: FWCC Indian River Field station, Indian River, Florida
Enumerated Domain Value: Common
Enumerated Domain Value Definition: Instruments common to all field labs.
Enumerated Domain Value: Charlotte Harbor
Enumerated Domain Value Definition: FWCC Charlotte Harbor Field station, Charlotte Harbor, Florida
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: HydroLab Used
Attribute Definition: Specific instrument package used to collect data. This field is filtered by the selection made in the Field Lab field to make selectable only those instrument packages owned by that Field Lab
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: Available within database as HydroCodes table.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: pH
Attribute Definition: pH reading taken at depth.
Attribute Measurement Frequency: As needed

Attribute:

Attribute Label: pH Instrument
Attribute Definition: Instrument used to measure pH. Defaults to the "HydroLab Used" field value.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Reference
Attribute Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatination of the sampling date, an "@" symbol, and the station code.

Attribute:
Attribute Label: Salinity
Attribute Definition: Salinity reading taken at depth. Measure in Parts Per Thousand (PPT).
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Salinity Instrument
Attribute Definition: Instrument used to measure Salinity. Defaults to the "HydroLab Used" field value.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Temperature
Attribute Definition: Temperature reading taken at depth. Measure in degrees Celsius.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Temperature Instrument
Attribute Definition: Instrument used to measure Temperature. Defaults to the "HydroLab Used" field value.
Attribute Measurement Frequency: As needed

Detailed Description:

Entity Type:
Entity Type Label: Gear Data Capture Subform
Entity Type Definition: Information captured concerning the Fisheries gear used at the site of sampling. This information is subcatagorized into either Seine or Trawl information

Attribute:
Attribute Label: Siene Method of capture
Attribute Definition: dataset created when the gear type choosen in the main table is of a Seine type deployment.
Attribute Domain Values:

Enumerated Domain:
Enumerated Domain Value: Bottom Type 1
Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom structure encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Type 2
Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom structure encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Veg 1
Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Veg 2
Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Veg Vitality 1
Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Veg Vitality 2
Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Veg Ratio 1
Enumerated Domain Value Definition: Numeric code depicting the percent this bottom vegetation makes up of all bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Veg Ratio 2
Enumerated Domain Value Definition: Numeric code depicting the percent this bottom vegetation makes up of all bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Shore Type 1
Enumerated Domain Value Definition: Double alpha character code depicting the type of shore structure encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Shore Type 2
Enumerated Domain Value Definition: Double alpha character code depicting the type of shore structure encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Shore Type Ratio 1
Enumerated Domain Value Definition: Numeric code depicting the percent this shore type makes up of all shore types encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bycatch Type 1
Enumerated Domain Value Definition: Double alpha character code depicting the type of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bycatch Type 2
Enumerated Domain Value Definition: Double alpha character code depicting the type of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bycatch Vitality 1
Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bycatch Vitality 2
Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bycatch Ratio 1
Enumerated Domain Value Definition: Numeric code depicting the percent this bycatch makes up of all bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bycatch Ratio 2
Enumerated Domain Value Definition: Numeric code depicting the percent this bycatch makes up of all bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bank
Enumerated Domain Value Definition: Single alpha code used to describe bank conditions encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Cover
Enumerated Domain Value Definition: Numeric value indicationg percent bottom cover by vegetation.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bank Distance
Enumerated Domain Value Definition: Estimated distance in meters to the nearest bank.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bycatch Quantity
Enumerated Domain Value Definition: Quantity in gallons of bycatch caught during sampling.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Relative Current
Enumerated Domain Value Definition: Strength in knots of current at time of sampling
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Relative Wind
Enumerated Domain Value Definition: Strength in mph of wind at time of sampling
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Wing Depth
Enumerated Domain Value Definition: Depth of water at deepest end of siene at the beginning of the pull.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Net Width
Enumerated Domain Value Definition: Width of net pulled in meters or panels
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Distance to Bag
Enumerated Domain Value Definition: Distance to the bag of a purse seine net. Measured in meters or panels
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Shore Distance
Enumerated Domain Value Definition: Distance to nearest shore in meters.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Reference
Enumerated Domain Value Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatination of the sampling date, an "@" symbol, and the station code.

Attribute Measurement Frequency: As needed

Attribute:

Attribute Label: Trawl Method of capture
Attribute Definition: dataset created when the gear type choosen in the main table is of a Trawl type deployment.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: Bottom Type 1
Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom structure encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bottom Type 2
Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom structure encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bottom Veg 1
Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bottom Veg 2
Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bottom Veg Vitality 1
Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bottom Veg Vitality 2
Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bottom Veg Ratio 1
Enumerated Domain Value Definition: Numeric code depicting the percent this bottom vegetation makes up of all bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bottom Veg Ratio 2
Enumerated Domain Value Definition: Numeric code depicting the percent this bottom vegetation makes up of all bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bycatch Type 1
Enumerated Domain Value Definition: Double alpha character code depicting the type of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bycatch Type 2
Enumerated Domain Value Definition: Double alpha character code depicting the type of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bycatch Vitality 1
Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bycatch Vitality 2
Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bycatch Ratio 1
Enumerated Domain Value Definition: Numeric code depicting the percent this bycatch makes up of all bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bycatch Ratio 2
Enumerated Domain Value Definition: Numeric code depicting the percent this bycatch makes up of all bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bycatch Quantity
Enumerated Domain Value Definition: Quantity in gallons of bycatch caught during sampling.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Soak Time
Enumerated Domain Value Definition: Amount of time the net was in the water.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Relative Current
Enumerated Domain Value Definition: Strength in knots of current at time of sampling
Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Relative Wind
Enumerated Domain Value Definition: Strength in mph of wind at time of sampling
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: End Depth
Enumerated Domain Value Definition: Depth of water at the end of trawl in meters.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Distance Towed
Enumerated Domain Value Definition: Distance net was towed in meters during sampling.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Bearing
Enumerated Domain Value Definition: Compass direction in which the net was pulled away from beginning set.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Speed
Enumerated Domain Value Definition: Speed in mph the net was pulled at.
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: Reference
Enumerated Domain Value Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatination of the sampling date, an "@" symbol, and the station code.

Attribute Measurement Frequency: As needed

Detailed Description:

Entity Type:

Entity Type Label: Ambient and Water Quality Data Subform
Entity Type Definition: Information captured concerning the ambient weather conditions at the site of sampling.

Attribute:

Attribute Label: Water Sample Confirmation Data
Attribute Definition: Data confirming the collection of specific samples for later analysis
Attribute Domain Values:

Enumerated Domain:

Enumerated Domain Value: Surface Water collection
Enumerated Domain Value Definition: Boolean field "Yes or No"
Enumerated Domain Value: Bottom Water Collection
Enumerated Domain Value Definition: Boolean field "Yes or No"
Enumerated Domain Value: Unfiltered Nutrient Processing
Enumerated Domain Value Definition: Boolean field "Yes or No"
Enumerated Domain Value: Turbidity
Enumerated Domain Value Definition: Boolean field "Yes or No"
Enumerated Domain Value: Filtered Nutrient
Enumerated Domain Value Definition: Amount of water filtered to provide nutrient analysis. Measured in milliliters.
Enumerated Domain Value: Chlorophyll A
Enumerated Domain Value Definition: Amount of water filtered to provide Chlorophyll A analysis. Measured in milliliters.
Enumerated Domain Value: Chlorophyll B
Enumerated Domain Value Definition: Amount of water filtered to provide Chlorophyll B analysis. Measured in milliliters.
Enumerated Domain Value: Reference
Enumerated Domain Value Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatination of the sampling date, an "@" symbol, and the station code.

Attribute Measurement Frequency: As needed

Attribute:

Attribute Label: Weather Data
Attribute Definition: Data describing aspects of surface conditions during sampling
Attribute Domain Values:

Enumerated Domain:

Enumerated Domain Value: Moon
Enumerated Domain Value Definition: Numeric code indicating the moon phase during sampling
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Period
Enumerated Domain Value Definition: Numeric code indicating the moon period phase during sampling
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Sunrise
Enumerated Domain Value Definition: Time at which sunrise occurred that morning
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Sunset
Enumerated Domain Value Definition: Time at which sunset occurred that evening
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Secchi Depth
Enumerated Domain Value Definition: Depth at which the Secchi disk is no longer visable.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Secchi Bottom

Enumerated Domain Value Definition: Bwhether or not the secchi disk was on the bottom when measurement was taken
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Wind Direction
Enumerated Domain Value Definition: Direction wind is coming from
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Wind speed
Enumerated Domain Value Definition: Speed of the wind in mph
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Cloud Cover
Enumerated Domain Value Definition: Visual estimation of the percent cloud cover during sampling
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Tide
Enumerated Domain Value Definition: Alpha character code indicating the tidal phase during sampling.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Reference
Enumerated Domain Value Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatination of the sampling date, an "@" symbol, and the station code.

Attribute Measurement Frequency: As needed

Detailed Description:

Entity Type:

Entity Type Label: Sediment Grab Data Subform
Entity Type Definition: Information captured concerning sediment grab sample testing

Attribute:

Attribute Label: Alternate Coordinates
Attribute Definition: Coordinates of sediment sampling site if different from original site coordinates.
Attribute Domain Values:

Enumerated Domain:

Enumerated Domain Value: Decimal Latitude
Enumerated Domain Value: Decimal Longitude
Enumerated Domain Value: Degree Latitude
Enumerated Domain Value: Degree Longitude
Enumerated Domain Value: Decimal Minute Latitude
Enumerated Domain Value: Decimal Minute Longitude
Enumerated Domain Value: Distance
Enumerated Domain Value Definition: Distance calculated in nautical miles of sampling site from orginal site

Attribute:

Attribute Label: Depth
Attribute Definition: Depth at which sample was taken.
Attribute Measurement Frequency: Required

Attribute:

Attribute Label: Grab Type
Attribute Definition: Type of test performed on sample.
Attribute Measurement Frequency: As needed

Attribute:

Attribute Label: Observations
Attribute Definition: Text field used to capture comments concerning data or its capture.

Attribute:

Attribute Label: Reference
Attribute Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatination of the sampling date, an "@" symbol, and the station code.

Attribute:

Attribute Label: Sample Codes
Attribute Definition: Codes used to desribe analysis of sample.
Attribute Domain Values:

Enumerated Domain:

Enumerated Domain Value: TOC
Enumerated Domain Value: BN1
Enumerated Domain Value: BN2
Enumerated Domain Value: PSZ
Enumerated Domain Value: PLS
Enumerated Domain Value: SC1
Enumerated Domain Value: SC2
Enumerated Domain Value: STX

Attribute:

Attribute Label: Sample Composition
Attribute Definition: Description of environment sample was taken from.
Attribute Domain Values:

Enumerated Domain:

Enumerated Domain Value: Mud
Enumerated Domain Value Definition: Bottom was primarily mud
Enumerated Domain Value: Sand
Enumerated Domain Value Definition: Bottom was primarily sand
Enumerated Domain Value: Muddy Sand
Enumerated Domain Value Definition: Bottom was primarily sand with mud component
Enumerated Domain Value: Sandy Mud
Enumerated Domain Value Definition: Bottom was primarily mud with sand component
Enumerated Domain Value: Shellhash
Enumerated Domain Value Definition: Bottom composed of broken shell debris

Attribute:
Attribute Label: SAV
Attribute Definition: Indicates presents or absents of Submerged Aquatic Vegetation
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: True
Enumerated Domain Value Definition: SAV was present
Enumerated Domain Value: False
Enumerated Domain Value Definition: SAV was not present
Attribute Measurement Frequency: As needed

Detailed Description:
Entity Type:
Entity Type Label: SAV Coverage Data Subform
Entity Type Definition: Information captured concerning Submerged Aquatic Vegetation bottom coverage.

Attribute:
Attribute Label: Alternate Coordinates
Attribute Definition: Coordinates of sediment sampling site if different from original site coordinates.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: Decimal Latitude
Enumerated Domain Value: Decimal Longitude
Enumerated Domain Value: Degree Latitude
Enumerated Domain Value: Degree Longitude
Enumerated Domain Value: Decimal Minute Latitude
Enumerated Domain Value: Decimal Minute Longitude
Enumerated Domain Value: Distance
Enumerated Domain Value Definition: Distance calculated in nautical miles of sampling site from orginal site

Attribute:
Attribute Label: Instrumentaion
Attribute Definition: Check boxes indicating intrument use to assess SAV coverage.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: Trawl
Enumerated Domain Value: SeaViewer
Enumerated Domain Value: Mask and Snorkel

Attribute:
Attribute Label: Methodology
Attribute Definition: Checkbox indicating how SAV coverage was assessed.

Attribute:
Attribute Label: Notes

Attribute:
Attribute Label: Reference
Attribute Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatination of the sampling date, an "@" symbol, and the station code.

Attribute:
Attribute Label: SAV Coverage
Attribute Definition: Visual estimation of SAV bottom coverage

Detailed Description:
Entity Type:
Entity Type Label: Fish Length Data Subform
Entity Type Definition: Information captured concerning Fish identification and up to twenty length measurements.

Attribute:
Attribute Label: Commonname
Attribute Definition: Lay person name for the specimens measured in this dataset.

Attribute:
Attribute Label: FHC
Attribute Definition: Fish Health Code used to identify analysis to be performed on specimens measured in this dataset.

Attribute:
Attribute Label: Len1
Attribute Definition: Length of first specimen measured.

Attribute:
Attribute Label: Len10
Attribute Definition: Length of tenth specimen measured.
Attribute:
Attribute Label: Len11
Attribute Definition: Length of eleventh specimen measured.
Attribute:
Attribute Label: Len12
Attribute Definition: Length of twelfth specimen measured.
Attribute:
Attribute Label: Len13
Attribute Definition: Length of thirteenth specimen measured.
Attribute:
Attribute Label: Len14
Attribute Definition: Length of fourteenth specimen measured.
Attribute:
Attribute Label: Len15
Attribute Definition: Length of fifteenth specimen measured.
Attribute:
Attribute Label: Len16
Attribute Definition: Length of sixteenth specimen measured.
Attribute:
Attribute Label: Len17
Attribute Definition: Length of seventeenth specimen measured.
Attribute:
Attribute Label: Len18
Attribute Definition: Length of eighteenth specimen measured.
Attribute:
Attribute Label: Len19
Attribute Definition: Length of nineteenth specimen measured.
Attribute:
Attribute Label: Len2
Attribute Definition: Length of second specimen measured.
Attribute:
Attribute Label: Len20
Attribute Definition: Length of twentieth specimen measured.
Attribute:
Attribute Label: Len3
Attribute Definition: Length of third specimen measured.
Attribute:
Attribute Label: Len4
Attribute Definition: Length offourth specimen measured.
Attribute:
Attribute Label: len5
Attribute Definition: Length of fifth specimen measured.
Attribute:
Attribute Label: Len6
Attribute Definition: Length of sixth specimen measured.
Attribute:
Attribute Label: Len7
Attribute Definition: Length of seventh specimen measured.
Attribute:
Attribute Label: Len8
Attribute Definition: Length of eighth specimen measured.
Attribute:
Attribute Label: Len9
Attribute Definition: Length of ninth specimen measured.
Attribute:
Attribute Label: Measure
Attribute Definition: Method used to capture length of specimens measured in this dataset.
Attribute:
Attribute Label: NODC
Attribute Definition: Numeric code developed by NODC to identify species measured in this dataset
Attribute:
Attribute Label: Reference
Attribute Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatination of the sampling date, an "@" symbol, and the station code.
Attribute:
Attribute Label: SC
Attribute:

Attribute Label: Scientificname
Attribute Definition: Genus and Species identification of the specimens measured in this dataset.

Attribute:
Attribute Label: Sex
Attribute Definition: Sex of the specimen measures in this dataset

Attribute:
Attribute Label: SplitLevel
Attribute Definition: Degree to which the splitting methodology was applied.

Attribute:
Attribute Label: SplitType
Attribute Definition: Methodology used to obtain a subsample of the specimens catch during this sampling effort.

Attribute:
Attribute Label: spp_code
Attribute Definition: Species code used by FIM for the species measured in this dataset.

Attribute:
Attribute Label: Tag
Attribute Definition: Tagging methodology used on the specimens measured in this dataset.

Attribute:
Attribute Label: TotalNumber
Attribute Definition: Total number of this specimen captured during this sampling effort.

Attribute:
Attribute Label: Use
Attribute Definition: List of codes indicating the analysis to be performed on the specimens measured in this dataset.

Detailed Description:

Entity Type:
Entity Type Label: Chemical Analysis Data Subform
Entity Type Definition: Information captured concerning Chemical Analysis perform on water and sediment samples.

Attribute:
Attribute Label: AnalysisDate
Attribute Definition: Date analysis of sample began.

Attribute:
Attribute Label: Code

Attribute:
Attribute Label: CollectionDate
Attribute Definition: Date sample was collected

Attribute:
Attribute Label: Component
Attribute Definition: Component analysis was performed upon.

Attribute:
Attribute Label: Contact
Attribute Definition: Person resonseble for submitting sample.

Attribute:
Attribute Label: Reference
Attribute Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatination of the sampling date, an "@" symbol, and the station code.

Attribute:
Attribute Label: Result
Attribute Definition: End product of analysis

Attribute:
Attribute Label: SampleLocation
Attribute Definition: Site sample was obtained

Attribute:
Attribute Label: StationName
Attribute Definition: Identifier of site sample was obtained.

Attribute:
Attribute Label: Submit
Attribute Definition: Date sample was submitted for analysis

Attribute:
Attribute Label: Test
Attribute Definition: Analytical test performed upon sample.

Attribute:
Attribute Label: Units
Attribute Definition: Units of measurement used to quanitfy RESULT.

Overview Description:
Entity and Attribute Overview: Initial Sampling Session Data
Entity and Attribute Detail Citation: Data captured during initial sampling of IMAP site.

APPENDIX C:

Generalized Station Description and Sampling protocol for IMAP.

The "Regional Stations" (i.e. stations selected within Sampling Units) will carry the following pieces of information

VARIABLE	DESCRIPTION
STATION	Station ID constructed of abbreviated sampling unit, sample year, and sample number
COASTNUM	Coastal 2000 station format
RANLONDD, RANLATDD	Lat, longs of sample sites in decimal degrees
GPSLONDEG, GPSLONMIN; GPSLATDEG, GPSLATMIN	Lat, longs in degrees and minutes format for input into GPS
SAMPLING UNIT	The name of the regional sampling unit (30 sites for each unit sampled)
SAMP_YR	The year in which the station is sampled (1=2000, 2=2001, etc.) - this information is redundant since year is in the station ID.
DEPSITE	Y OR N - If yes, an additional sample kit will be sent out to sample a set of water indicators for the DEP freshwater monitoring program (we are responsible for only seven sites in 2000)
DEPSTA	The corresponding DEP station identifier for the relevant sites. This station id should be noted in the comments portion of the datasheet.
PRIMARY FIELD LAB	Indicates the field lab with primary responsibility for sampling. The allocation of sites for 2001-2004 is tentative and is still being reviewed. The allocation of sites for 2000 is fixed.
COMMENT	Contains relevant comments -e.g. SWFWD sampling 2 TB sites.

The "State Scale Stations" will carry the following pieces of information:

VARIABLE	DESCRIPTION
STATION	Station ID constructed of abbreviated state station type(STR= random, STT=trend, or fixed), sample year, and station number. STT sites will be sampled every year.
COASTNUM	Coastal 2000 station format
LONDD, LATDD	Lat, longs of sample sites in decimal degrees
GPSLONDEG, GPSLONMIN; GPSLATDEG, GPSLATMIN	Lat, longs in degrees and minutes format for input into GPS
TREND_SITE	Identifies a state site as either random or trend - this information is partially redundant with the station ID.
SAMP_YR	The year in which the station is sampled (1=2000, 2=2001, etc.) - this information is partially redundant with the station ID.
QASITE	Y OR N - If yes, an additional grab for sediment contaminants will be collected. We will have three (10%) QA sites each year for contaminants (recall that contaminants are only sampled at the statewide scale)
DEPSTA	The corresponding DEP station identifier for the relevant sites. This station id should be noted in the comments portion of the datasheet.
PRIMARY FIELD LAB	Indicates the field lab with primary responsibility for sampling. The allocation of sites for 2001-2004 is tentative and is still being reviewed. The allocation of sites for 2000 is fixed.

General Reconaissance and Sampling Issues.

Reconnaissance of stations - the objective of station recon is twofold:

1. Determine if the site is sampleable (e.g. on the water vs. dry land, outside a major shipping lane, etc.) - If the station can be safely sampled for some indicators, but not others, we will retain the station and omit the problem indicators (however, see note below under station relocation)
2. Determine if the site is salt or fresh - this applies primarily to the DEP sites, but if you suspect a non-DEP site is fresh, recon it and get a salinity measurement. If you encounter freshwater non-DEP sites, let Gil or Bob know and they will make a decision regarding indicators to be sampled.

Relocation of stations - you are free to move up to 300 feet to get to a sampleable area. This applies both to "dry-land" type situations and situations where you can sample one indicator but not another. For example, if you are able to take hydrolab measurements, but not benthic grabs due to the presence of an oyster bar, you can move up to 300 feet to get a benthic grab. You do not re-take the hydrolab measurements at the new location, but use the original readings. In the observation box of the benthic grab section on the datasheet, record a new lat/long for the location at which the benthic grabs were taken.

Parameters to be analyzed by DEP Bureau of Labs - please note that the benthic biology, sediment contaminants and additional indicators for the DEP sites are being worked up by DEP in Tally. You will be getting coolers with sampling kits sent to you from Tally for these indicators. The coolers contain sampling bottles, return shipping labels, and a DEP datasheet. You need to fill out the DEP datasheet with location and sample-type information. You will receive detailed protocols for the DEP indicators.